SSDC-R/C

Step-Servo System Hardware Manual

SSDC03/06/10-R

SSDC03/06/10-R-FC

SSDC03/06/10-C

SSDC03/06/10-C-FC

SHANGHAI AMP&MOONS' AUTOMATION CO.,LTD.

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1 Introduction

Thank you for selecting the MOONS' SSDC series Step-Servo drive and motor. SSDC series combines servo technology with a stepper motor to create a product with exceptional feature and broad capability.

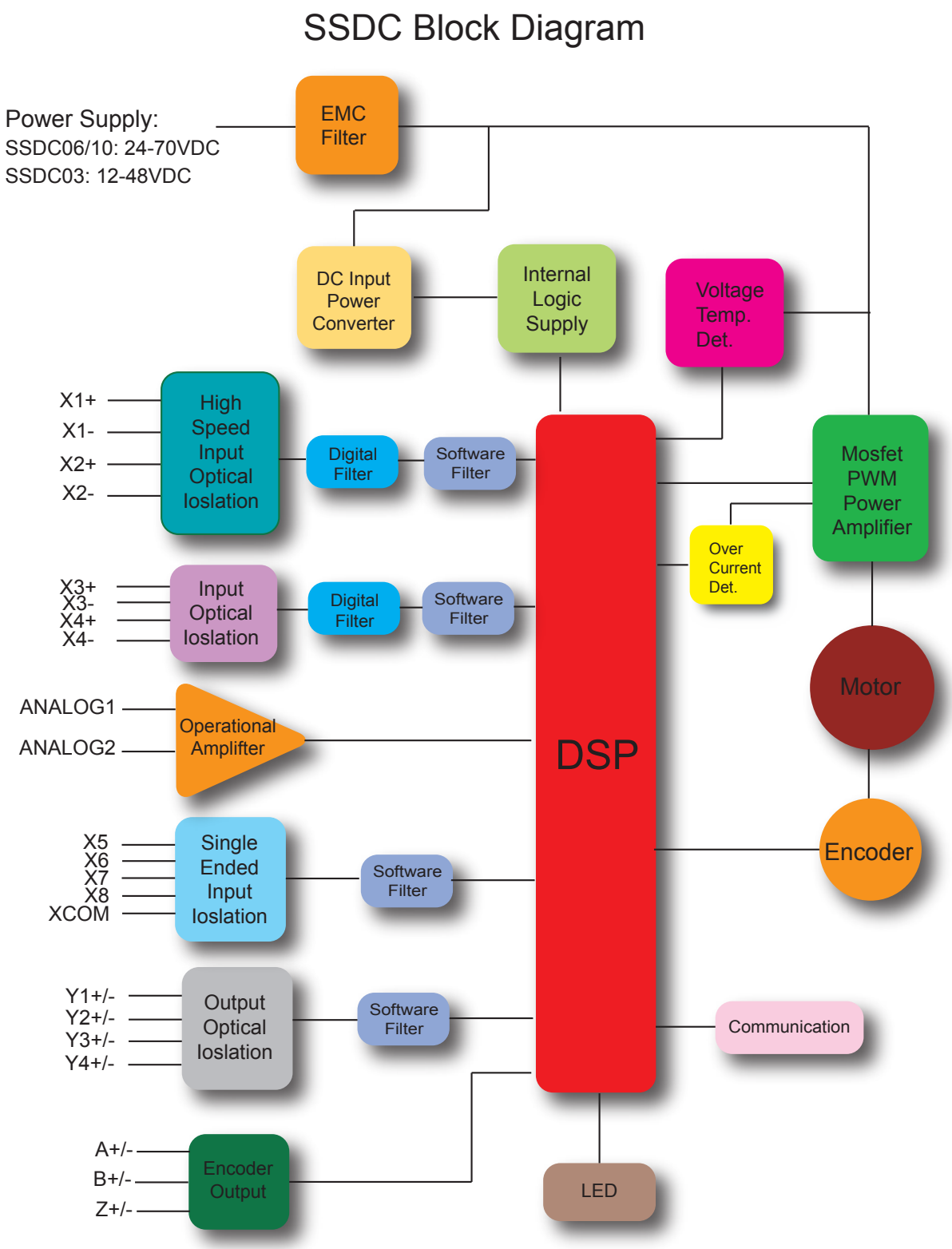
The SSDC series is a high performance, intelligent Step-Servo system with multi-axes field bus control.

SSDC-R supports the RS-485/422 communication. SSDC-C supports the CANopen communication. The SCL commands, Modbus commands and CANopen commands can be used to control the drive and motor in real time. The motion control program can be stored in the drive (Q program) and then the SCL commands, Modbus commands or CANopen commands can be used to call programs flexibly.

1.1 Features

- Programmable, digital step-servo drive and motor package
- Control modes:
  Velocity Control: Digital signal control, Analog control, SCL command, Q programming
  Position Control: Digital signal control, Analog control, SCL command, Q programming
  Torque Control: Analog control, SCL command, Q programming
- Multi-operation modes:
  Closed-loop Servo control mode, Closed-loop Step control mode, Full closed-loop mode
- Current output
  SSDC03 output current：continuous 3A/phase（peak of sin），boost 4A(1.5s)
  SSDC06 output current：continuous 6A/phase（peak of sin），boost 7.5A(1.5s)
  SSDC10 output current：continuous 10A/phase（peak of sin），boost 15A(1.5s)
- Wide range input voltage:
  SSDC03：12~48VDC
  SSDC06：24~70VDC
  SSDC10：24~70VDC
- Encoder resolution：
  20000 counts/rev (AM17/23/24/34SS-N motor)
  4096 counts/rev (AM11/17/23/24/34RS motor)
- Differential encoder outputs (ENC A+/-, ENC B+/-, ENC Z+/-), 26C31 line driver, 20 mA sink or source max
- Support secondary encoder signal input(single-ended or differential) for full closed-loop control
- Abundant I/O interface
  8 optically isolated digital inputs,5-24VDC
  4 optically isolated digital outputs,max30V/100mA
  2 analog inputs can be configured to 0-5V, 0-10V, ±5V or ±10V signal ranges
- Communication
  -R：Dual-port RJ45 connector，RS-485/422，Modbus/RTU protocol
  -C：Dual-port RJ45 connector，CANopen, conform CiA301 and CiA402, RS-232 serial port for configuration

1.2 Block Diagram



1.3 Safety Instructions

Only qualified personnel should transport, assemble, install, operate, or maintain this equipment. Properly qualified personnel are persons who are familiar with the transport, assembly, installation, operation, and maintenance of motors, and who meet the appropriate qualifications for their jobs.

To minimize the risk of potential safety problems, all applicable local and national codes regulating the installation and operation of equipment should be followed. These codes may vary from area to area and it is the responsibility of the operating personnel to determine which codes should be followed, and to verify that the equipment, installation, and operation are in compliance with the latest revision of these codes.

Equipment damage or serious injury to personnel can result from the failure to follow all applicable codes and standards. MOONS' does not guarantee the products described in this publication are suitable for a particular application, nor do they assume any responsibility for product design, installation, or operation.

Read all available documentation before assembly and operation. Incorrect handling of the products referenced in this manual can result in injury and damage to persons and machinery.

All technical information concerning the installation requirements must be strictly adhered to.

It is vital to ensure that all system components are connected to earth ground. Electrical safety is impossible without a low-resistance earth connection.

This product contains electrostatically sensitive components that can be damaged by incorrect handling. Follow qualified anti-static procedures before touching the product.

During operation keep all covers and cabinet doors shut to avoid any hazards that could possibly cause severe damage to the product or personal health.

During operation, the product may have components that are live or have hot surfaces.

Never plug in or unplug the Integrated Motor while the system is live. The possibility of electric arcing can cause damage.

Be alert to the potential for personal injury. Follow recommended precautions and safe operating practices emphasized with alert symbols. Safety notices in this manual provide important information. Read and be familiar with these instructions before attempting installation, operation, or maintenance. The purpose of this section is to alert users to the possible safety hazards associated with this equipment and the precautions necessary to reduce the risk of personal injury and damage to equipment. Failure to observe these precautions could result in serious bodily injury, damage to the equipment, or operational difficulty.

2 Getting Started

The following items are needed:

- A 12-70VDC power supply, see the section below entitled “Choose a Power Supply” for helping to choose the right one.
- A compatible SS or RS motor, please see the section below entitled “Recommended Motor”
- A small flat blade screwdriver for tightening the connectors screw(included)
- A PC running Microsoft Windows XP/Vista/7/8(Using serial communication port. Prepare an USB to Serial converter if the PC doesn’t have it.
- Install the Step-Servo Quick Tuner software (download from MOONS website: www.moonsindustries.com)
- A power cable(included)
- Communication cable:
  -R type：Included a CAT5 cable, used to do the daisy-chain connection for the RS-485/422 network. It is used to configure the drive.
  -C type：Included a RS-232 serial cable, used to configure the drive.Included a CAT5 cable, used to do the daisy-chain connection for the CANopen network.
- Optional extended motor cable(Sold separately)
- Optional extended encoder cable(Sold separately)
- Optional extended I/O cable(Sold separately)

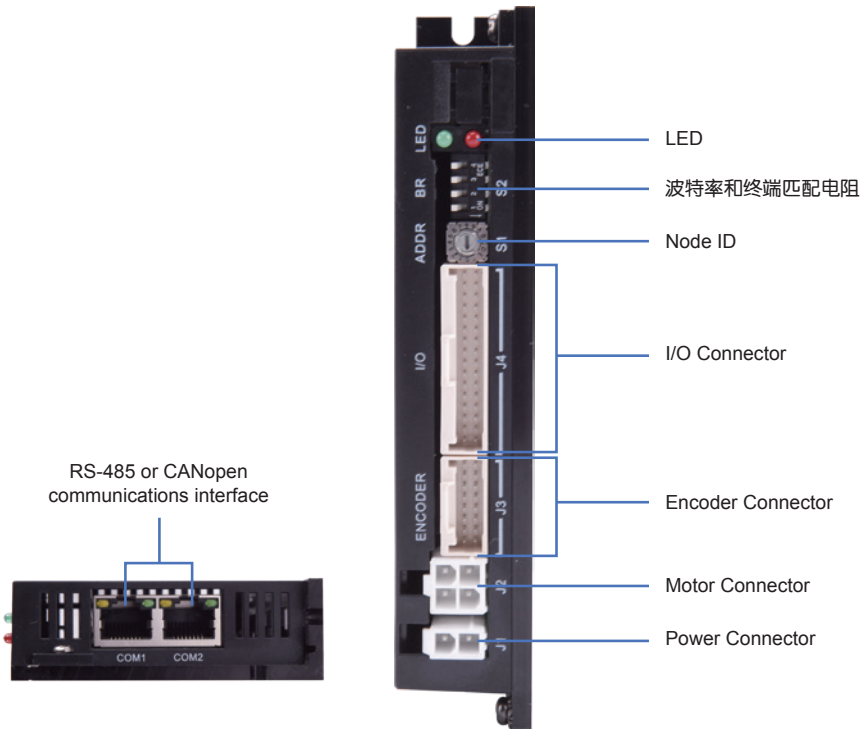
2.1 Installing Software

Step-Servo Quick Tuner is the PC based software application used to configure, and perform servo tuning, drive testing and evaluation of the step-servo products. System servo control gains, drive functionality and I/O configuration are set with Step-Servo Quick Tuner. It also contains an oscilloscope function to help set the servo control gains.

- Download the ***Step-Servo Quick Tuner*** from the MOONS' website and install it.
- Launch the software by clicking Start-----Programs ----MOONS'
- Connect the drive to PC by communication cable. Please see the section below entitled "Choosing the Right COM Port".
  -R type：Use the CAT5 cable to connect the PC and drive
  -C type：Use the RS-232 serial cable to connect the PC and drive
- Connect the drive to the Power Supply.
- Connect the motor to the drive.
- Power up the drive.
- The software will recognize your drive, display the model and firmware version and be ready for action.

The connectors and other points of interest are illustrated below:

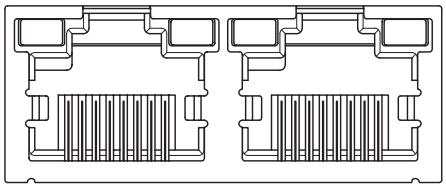
SSDC-R, RS485 Communication type / SSDC-C, CANopen Communication type



2.2 Connecting to the Communication Port

2.2.1 RS-485/422 communication port（-R type）

RS-485/422 communication port



PIN	Definition	Color
1	RX+	Orange/White
2	RX-	Orange
3	TX+	Green/White
4	NC	Blue
5	NC	Blue/White
6	TX-	Green
7	GND	Brown/Whitelv
8	GND	Brown

Connecting to a Host using RS-485

Before configure the drive by Step-Servo Quick tuner software, use the CAT5 cable to connect the drive(COM1 or COM2) and host.

RS-485 four-wire connection

Drive	Connection
RX+	Connect to the host's TX+
RX-	Connect to the host's TX-
TX+	Connect to the host's RX+
TX-	Connect to the host's RX-
GND	Connect to the host's GND

RS-485 two-wire connection

Drive	Connection
RX+	Connect to the host's +
RX-	Connect to the host's -
TX+	Connect to the host's +
TX-	Connect to the host's -
GND	Connect to the host's GND

(NOTE: The RS-485 port on the drive is isolated from internal circuitry of the drive. So the GND of each drive's RS-485 port must be connected together. The first drive's GND of the RS-485 port must be connected to the GND of RS-485 port on the host PC or controller.)

RS-485 network connection

Multiple –R model drive network can be built via dual RS-485 communication port by daisy chain cable or network cable provided.

RS-485 Four-wire Configuration

RS-485 four-wire system utilize separate transmit and receive wires. One pair of wires connect the host's transmit signals(TX+/TX-) to each drive's RX+/RX- receive terminals. The other pair connects the drive's TX+/TX- terminals to the host's receive signals. A logical ground terminal is provided on each drive and can be used to keep all the drives at the same ground potential. The first drive's logical GND of the RS-485 bus must connect to host's ground.

Four-wire Connection

Connect the drive's RX+ to the TX+ terminal of the host controller, and connect the drive's RX- to the TX- terminal of the host controller. Connect the drive's TX+ to the RX+ terminal of the host controller, and connect the drive's TX- to the RX- terminal of the host controller. Connect the drive's GND and the host's GND to a same ground.

RS-485 Tow-wire Configuration

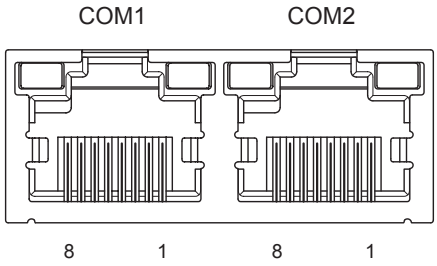
In a two-wire system, the data transmitting and receiving use a same cable. The host must stop its transmitting before receiving data. That means the host must stop transmit data before drive begins to answer a query which just come from the host, otherwise the host cannot receive any data witch sent from a drive. There is a transmit delay parameter that can be adjusted to compensate for a host that is slow to disable its transmitter. This adjustment can be set over the network using the TD command, it also can be set by using the Step-Servo Quick Tuner software. Users can set a shorter transmit delay in a four-wire system.

Two-wire connection

The RX+ and TX+ of the drive connect to the host's + in parallel. The RX- and TX- of the drive connect to the host's - in parallel. Connect the drive's GND and the host's GND to a same ground.

2.2.2 CANopen Connecting communication（-C type）

CANopen COM Port



PIN	COM1 Signal	COM2 Signal	Color
1	CAN_H	CAN_H	Orange/White
2	CAN_L	CAN_L	Orange
3	GND	GND	Green/White
4	RS-232_TX	NC	Blue
5	RS-232_RX	NC	Blue/White
6	NC	NC	Green
7	GND	GND	Brown/Whitelv
8	GND	GND	Brown

PC connection with RS-232 cable

Before using Step-Servo Quick Tuner for -C drive configuration, please connect COM1 on the driver to host PC by RS-232 programming cable.

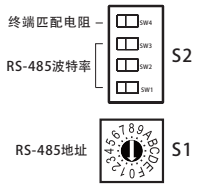
CANopen network connection

Multiple -C model drive network can be built via dual CANopen communication port by daisy-chain cable or network cable provided.

(NOTE: The CANopen port on the drive is isolated from internal circuitry of the drive. So the GND of each drive's CANopen port must be connected together. The first drive's GND of the CANopen port must be connected to the GND of CANopen port on the controller.)

2.3 Setting Node ID and baud rate

SSDC drives have one rotary switch and one piano switch to set the Node ID, baud rate and terminal resistor.

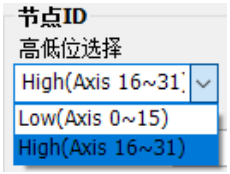


2.3.1 RS-485 Node ID and baud rate settings（-R type）

Set drive's RS-485 Node ID by rotary switch S1

Set drive's RS-485 baud rate and terminal resistor by piano switch S2

S1 is used to set drive's RS-485 address, and the range is 0~F (0~15 in decimal). If you want to set the RS-485 Node ID range to 10~1F(16~31 in decimal), you need to configure it in *Step-Servo Quick tuner* software.



高低位选择	S1旋转开关位置	SCL地址	高低位选择	S1旋转开关位置	SCL地址
Lower(Axis 0~15)	0	0	Upper(Axis 16~31)	0	@
	1	1		1	!
	2	2		2	"
	3	3		3	#
	4	4		4	$
	5	5		5	%
	6	6		6	&
	7	7		7	'
	8	8		8	(
	9	9		9	)
	A	:		A	*
	B	;		B	+
	C	<		C	,
	D	=		D	-
	E	>		E	.
	F	?		F	/

S2 used to set the RS-485 baud rate, SW1, SW2 and SW3 are used to set the baud rate. SW4 is used to set the terminal resistor.

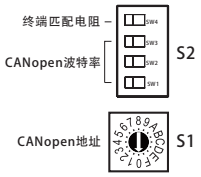
RS-485/422 communication baud rate

SW1	SW2	SW3	Baud rate（bps）
OFF	OFF	OFF	9600
OFF	OFF	ON	19200
OFF	ON	OFF	38400
OFF	ON	ON	57600
ON	OFF	OFF	115200
ON	OFF	ON	/
ON	ON	OFF	/
ON	ON	ON	/

Terminal resistor

SW4	OFF	Disconnected
	ON	Connected

2.3.2 CANopen Node ID and baud rate settings(-C model)

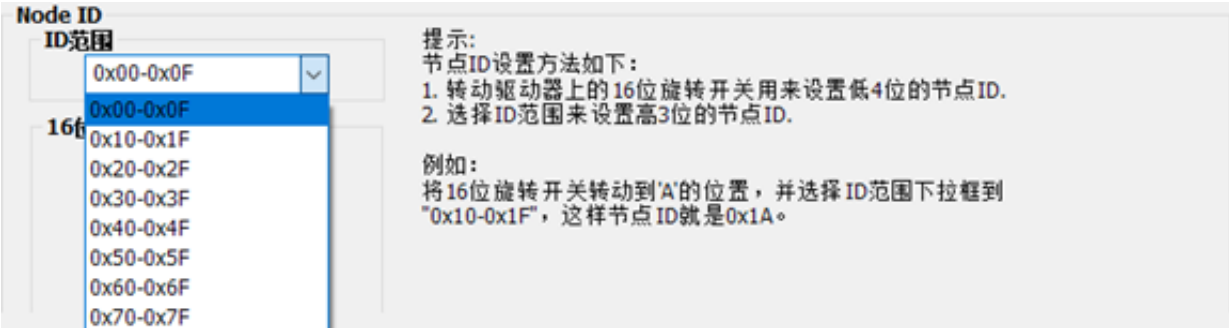


Set the lower 4 bits of drive's CANopen Node ID by rotary switch S1

Set drive's CANopen baud rate and terminal resistor by piano switch S2

Each node on a CANopen network must have a unique Node ID. Valid ranges for the Node ID are 0x01 through 0x7F (1~127). Node ID 0x00 is reserved in accordance with CiA301. The Node ID is selected using rotary switches and software; one sixteen position switch set the lower four bits (0~F) of node ID, while upper three bits of node ID are configured by Step-Servo Quick Tuner software. Each time when Node ID is changed, a power cycle is required before the new Node ID is valid.

Please refer to the CANopen manual for more information.



S2 used to set the CANopen baud rate, SW1, SW2 and SW3 are used to set the baud rate. SW4 is used to set the terminal resistor.

CANopen communication baud rate

SW1	SW2	SW3	Baud rate（bps）
OFF	OFF	OFF	1M
OFF	OFF	ON	800K
OFF	ON	OFF	500K
OFF	ON	ON	250K
ON	OFF	OFF	125K
ON	OFF	ON	50K
ON	ON	OFF	20K
ON	ON	ON	12.5K

Terminal resistor

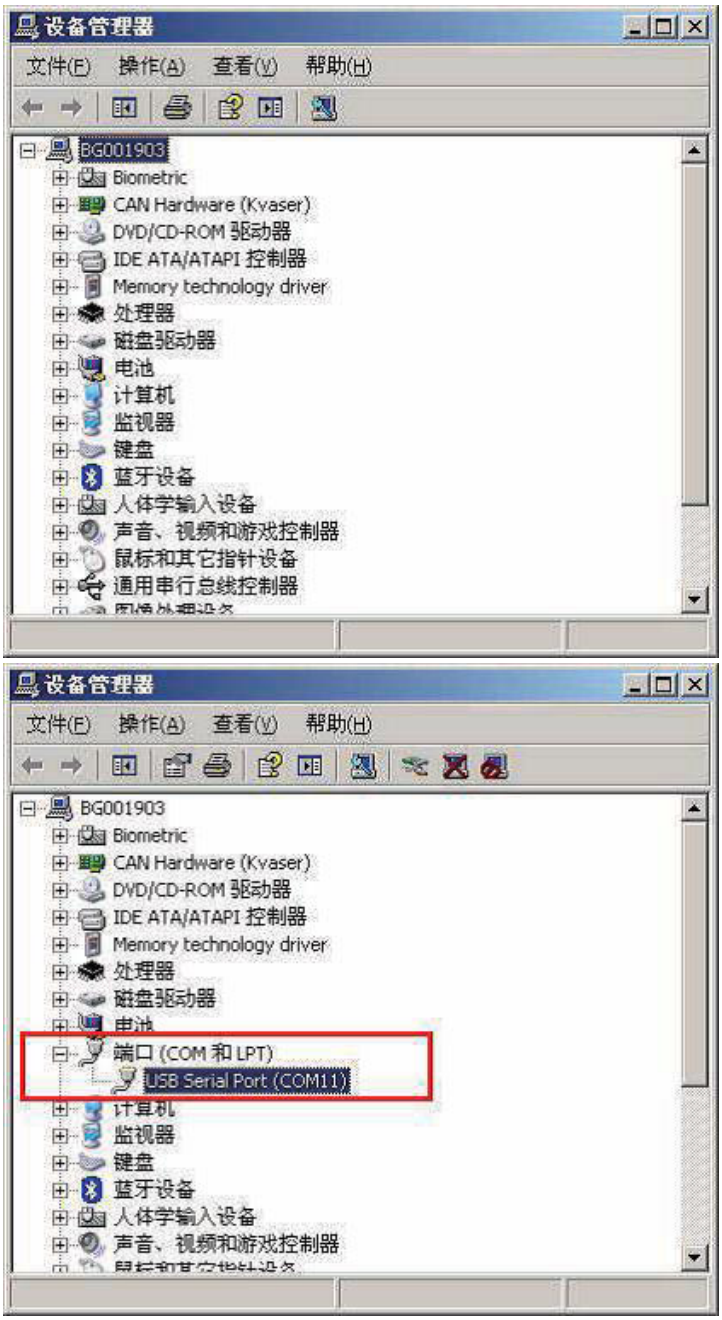
SW4	OFF	Disconnected
	ON	Connected

2.4 Choosing the Right COM Port

Open the “Device Manager” on the PC. There may or may not be a “Ports” selection.

Connect the mini USB cable to the PC. The connected COM port should then be displayed.

Choose this new COM(n) port in the Step-Servo Quick Tuner software.



2.5 Connecting the Power Supply

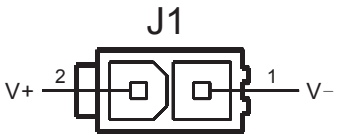
The SSDC series step-servo drive and motor are shipped with a power cable, 2 meters long. Connect the red wire to the positive of the power supply. Connect the black wire to the negative of the power supply. Plug the cable into the power connector of the drive.

(NOTE: Be careful not to reverse the wires. Reversing the connection may open the internal fuse on the drive and void the warranty.)

SSDC03: 12 – 48VDC

SSDC06: 24 – 70VDC

SSDC10: 24 – 70VDC



Power Connector

Connect the chassis to the earth ground through the grounding screws.

The section entitled “Choosing a Power Supply” will help you to select a right power supply.

2.6 Choosing a Power Supply

The main considerations when choosing a power supply are the voltage and current requirements for the application.

2.6.1 Voltage

The SSDC drive is designed to give optimum performance between 24 and 48 Volts DC. Choosing the voltage depends on the performance needed and motor/drive heating that is acceptable and/or does not cause a drive over-temperature. Higher voltages will give higher speed performance but will cause the RS driver to produce higher temperatures. Using power supplies with voltage outputs that are near the drive maximum may significantly reduce the operational duty-cycle.

SSDC03

For the SSDC03 drive, the extended range of operation can be as low as 11 VDC minimum to as high as 53 VDC maximum. When operating below 11 VDC, the power supply input may require larger capacitance to prevent under-voltage and internal-supply alarms. Current spikes may make supply readings erratic. The supply input cannot go below 11 VDC for reliable operation. This will not fault the drive. Absolute maximum power supply input is 53 VDC at which point an over-voltage alarm and fault will occur. When using a power supply that is regulated and is near the drive maximum voltage of 53 VDC, a voltage clamp may be required to prevent over-voltage when regeneration occurs. When using an unregulated power supply, make sure the no-load voltage of the supply does not exceed the drive's maximum input voltage of 53 VDC.

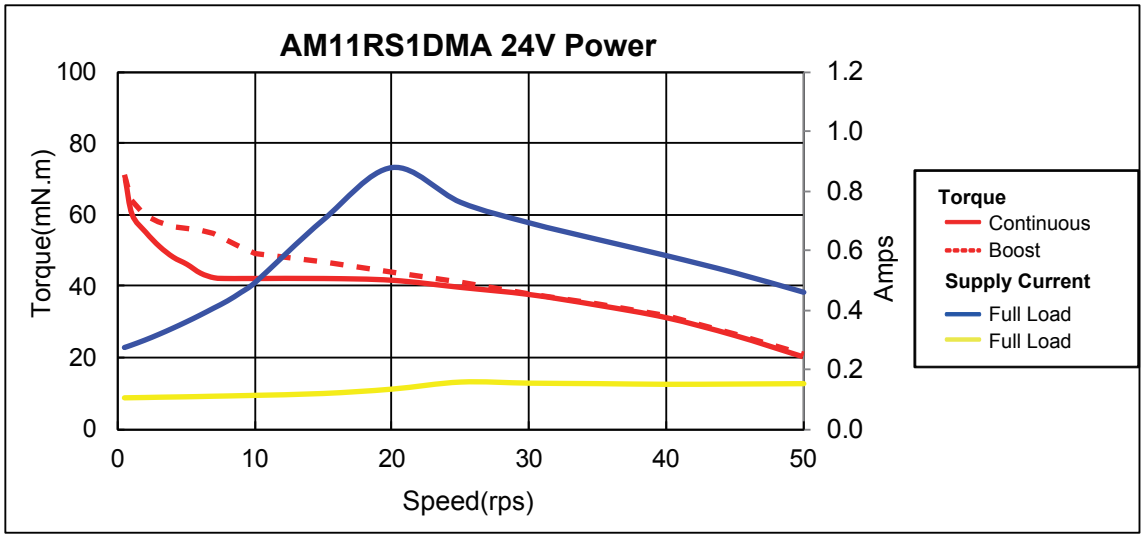
SSDC06/10

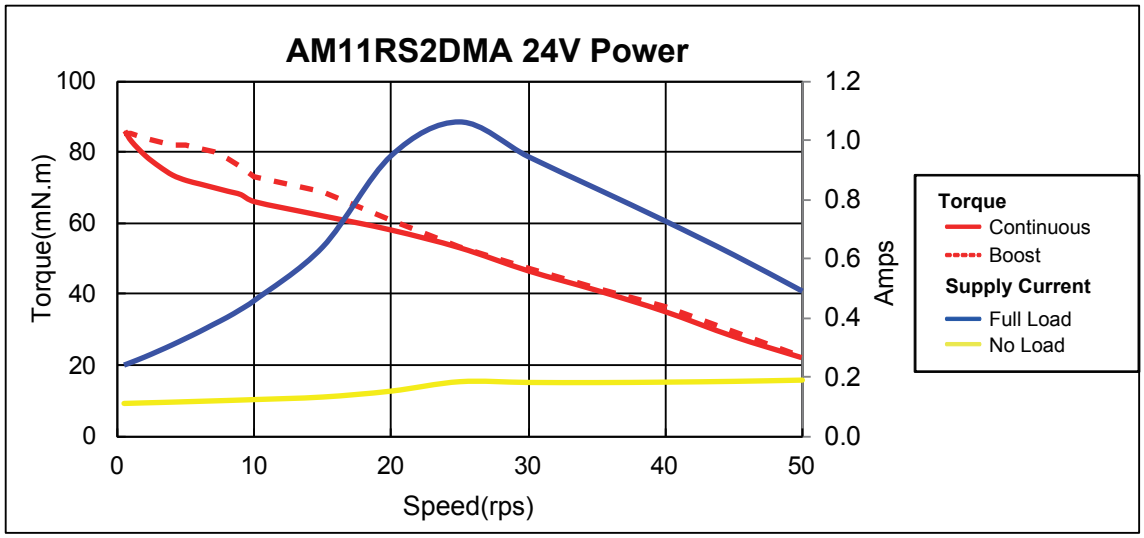
For the SSDC06/10 drive, the extended range of operation can be as low as 18 VDC minimum to as high as 75 VDC maximum. When operating below 18 VDC, the power supply input may require larger capacitance to prevent under-voltage and internal-supply alarms. Current spikes may make supply readings erratic. The supply input cannot go below 18 VDC for reliable operation. This will not fault the drive. Absolute maximum power supply input is 75 VDC at which point an over-voltage alarm and fault will occur. When using a power supply that is regulated and is near the drive maximum voltage of 75 VDC, a voltage clamp may be required to prevent over-voltage when regeneration occurs. When using an unregulated power supply, make sure the no-load voltage of the supply does not exceed the drive's maximum input voltage of 75 VDC.

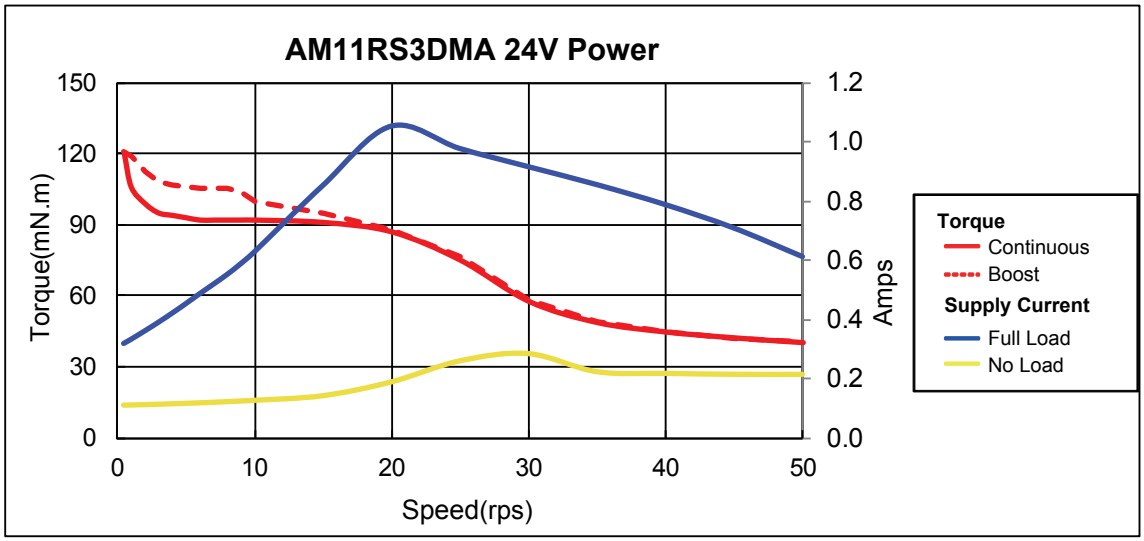
2.6.2 Current

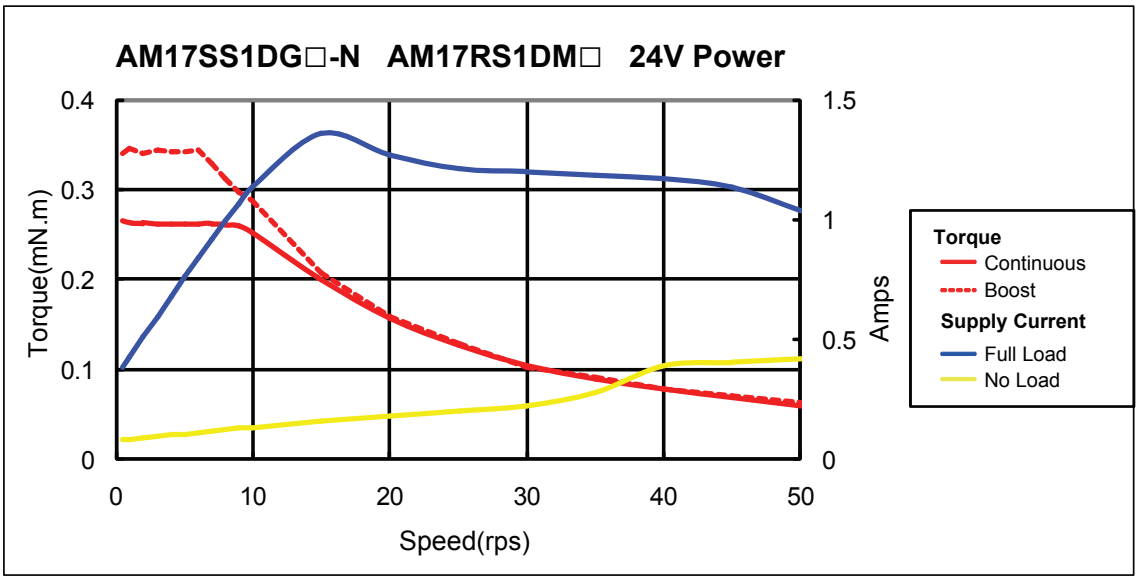
The maximum supply currents required by the SSDC series step servo drive and motor are shown below in chats at different power supply voltage input. The SSDC drive power supply current is lower than the winding currents because it uses switching amplifiers to convert a high voltage and low current into low voltage and high current. The more power supply voltage exceeds the motor voltage, the less current will be required from the power supply.

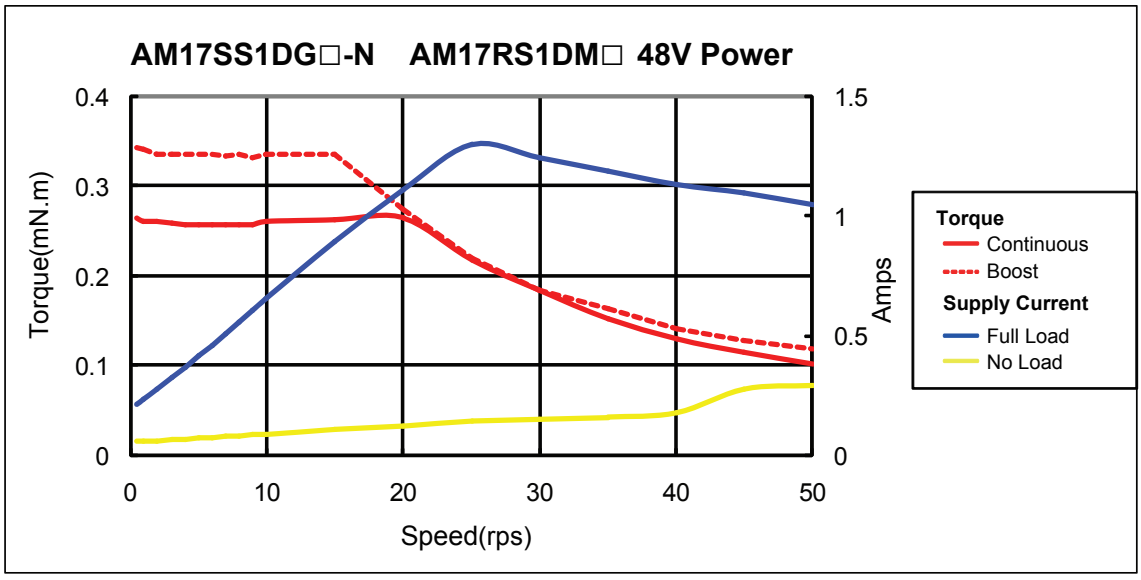
It is important to note that the current draw is significantly different at higher speeds depending on the torque load to the motor. Estimating how much current is necessary may require a good analysis of the load to the motor.

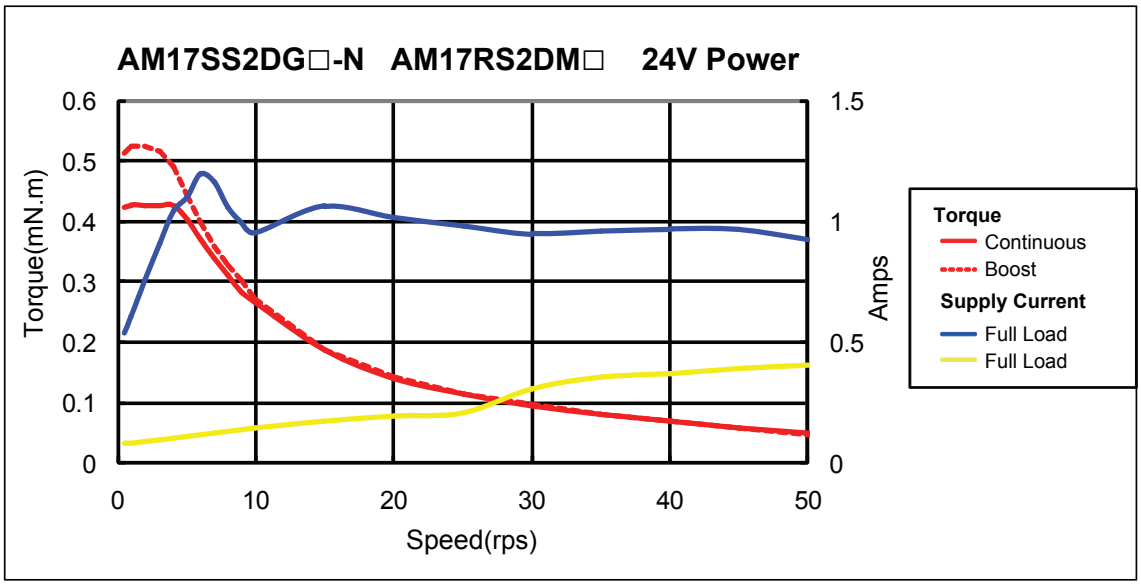


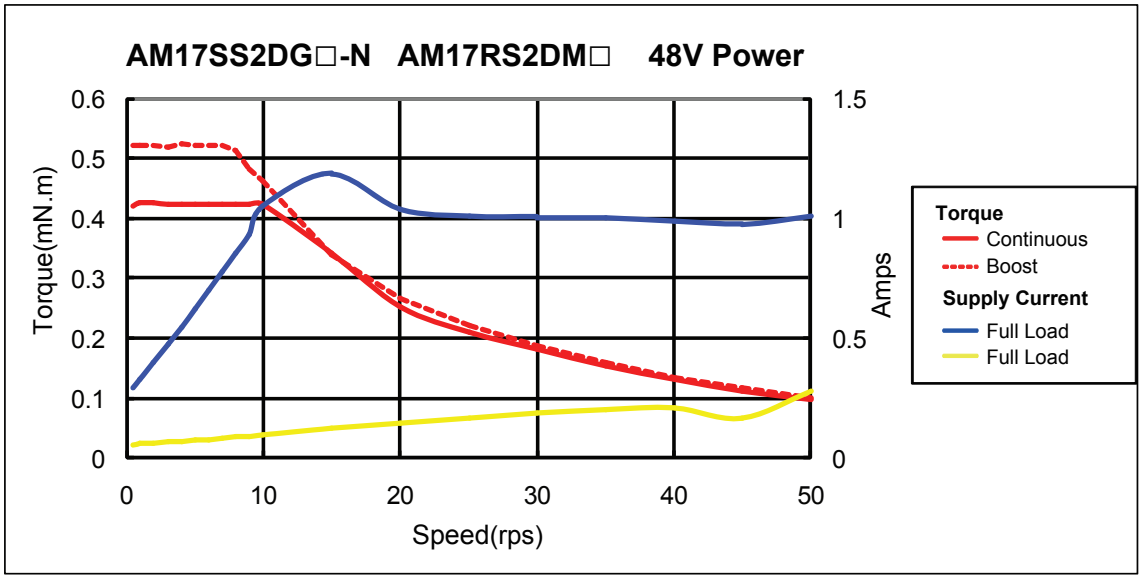


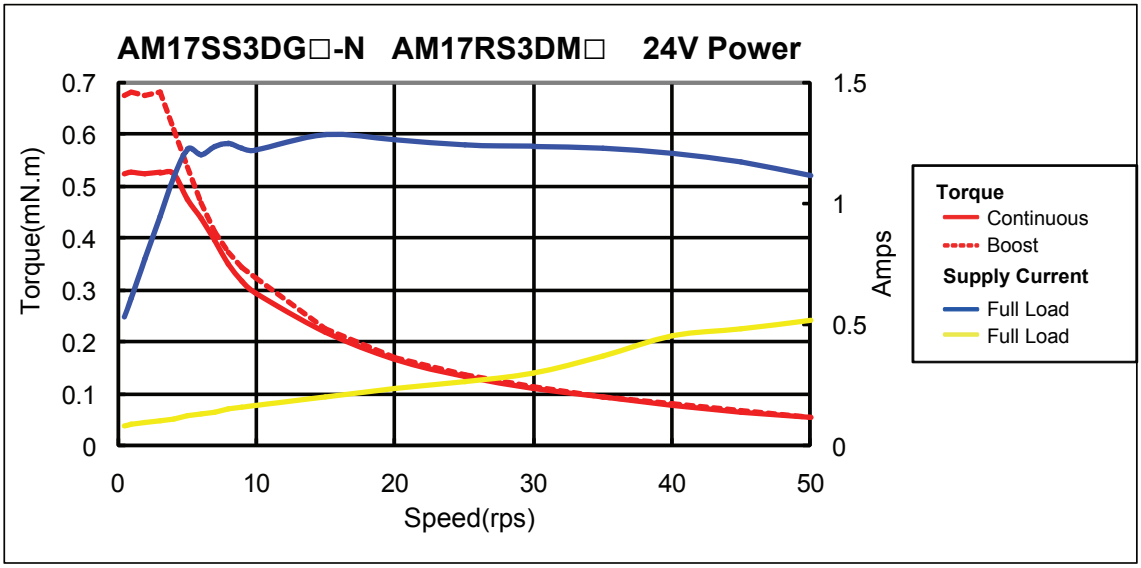

AM11RS3DMA 24V Power
Torque(mN.m)
Amps
Speed(rps)
150
120
90
60
30
0
1.2
1.0
0.8
0.6
0.4
0.2
0.0
0
10
20
30
40
50
Torque
Continuous
Boost
Supply Current
Full Load
No Load

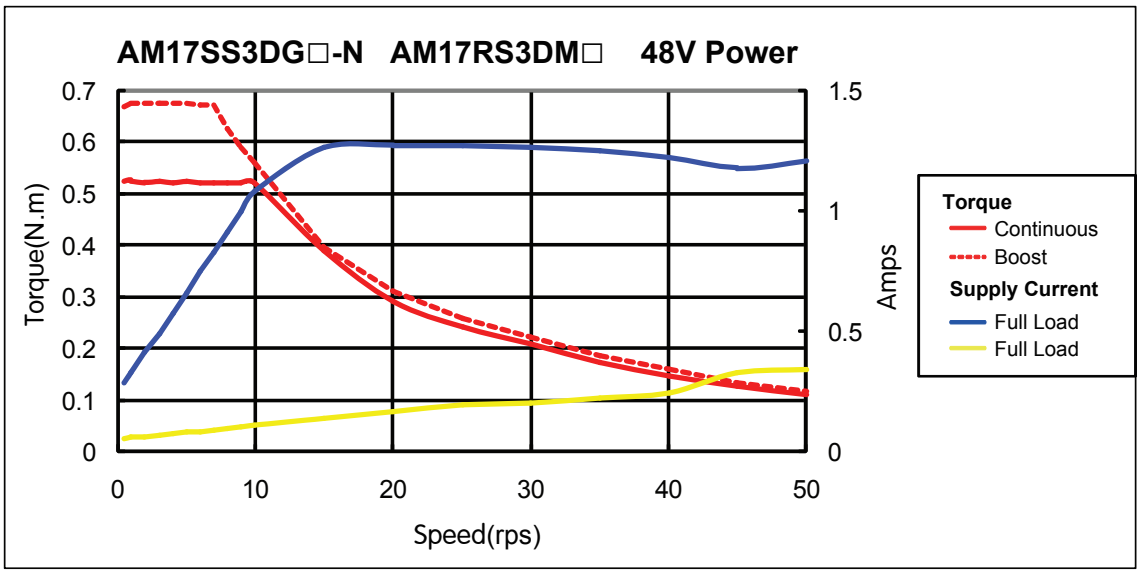

AM17SS1DG□-N AM17RS1DM□ 24V Power
Torque(mN.m)
Amps
Speed(rps)
0.4
0.3
0.2
0.1
0
1.5
1
0.5
0
0
10
20
30
40
50
Torque
Continuous
Boost
Supply Current
Full Load
No Load

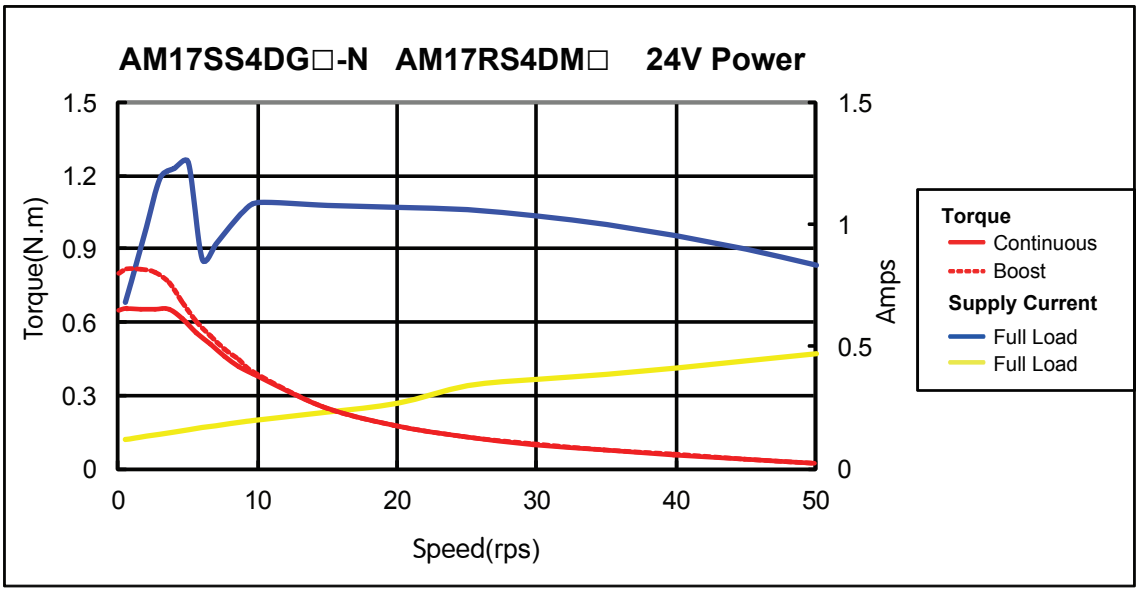

AM17SS1DG□-N AM17RS1DM□ 48V Power
Torque(mN.m)
Amps
Speed(rps)
0.4
0.3
0.2
0.1
0
1.5
1
0.5
0
0
10
20
30
40
50
Torque
Continuous
Boost
Supply Current
Full Load
No Load

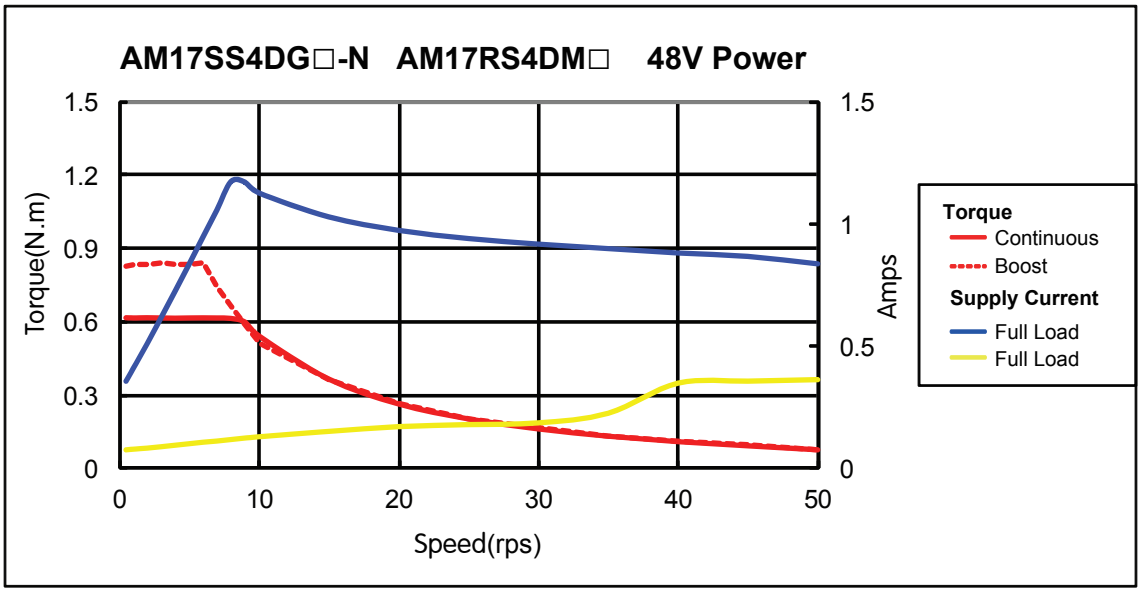

AM17SS2DG□-N AM17RS2DM□ 24V Power
Torque(mN.m)
0.6
0.5
0.4
0.3
0.2
0.1
0
1.5
1
0.5
0
Amps
0
10
20
30
40
50
Speed(rps)
Torque
Continuous
Boost
Supply Current
Full Load
Full Load

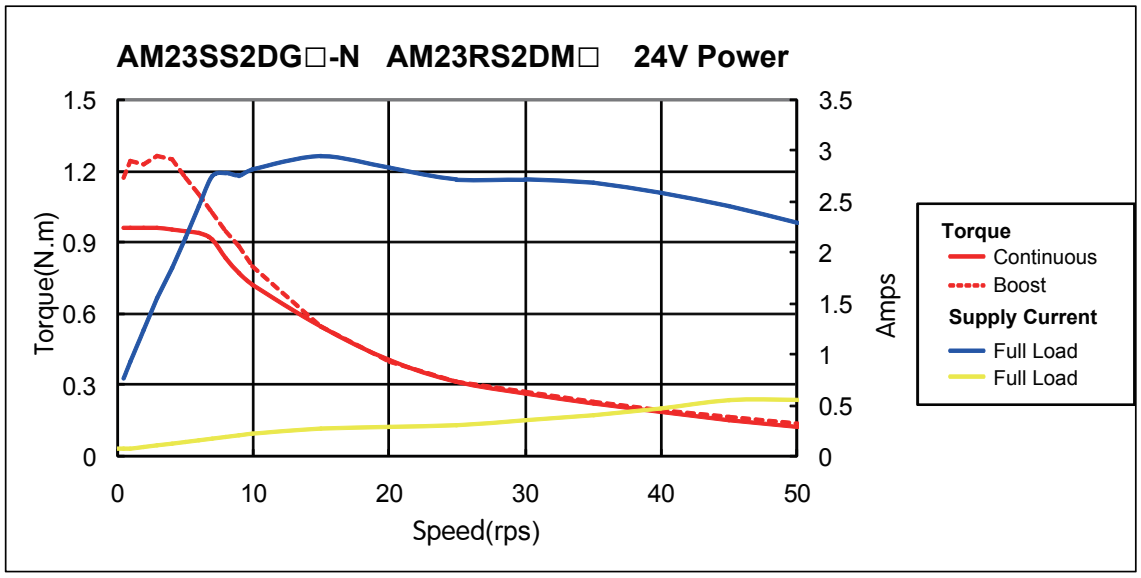

AM17SS2DG□-N AM17RS2DM□ 48V Power
Torque(mN.m)
0.6
0.5
0.4
0.3
0.2
0.1
0
1.5
1
0.5
0
Amps
0
10
20
30
40
50
Speed(rps)
Torque
Continuous
Boost
Supply Current
Full Load
Full Load

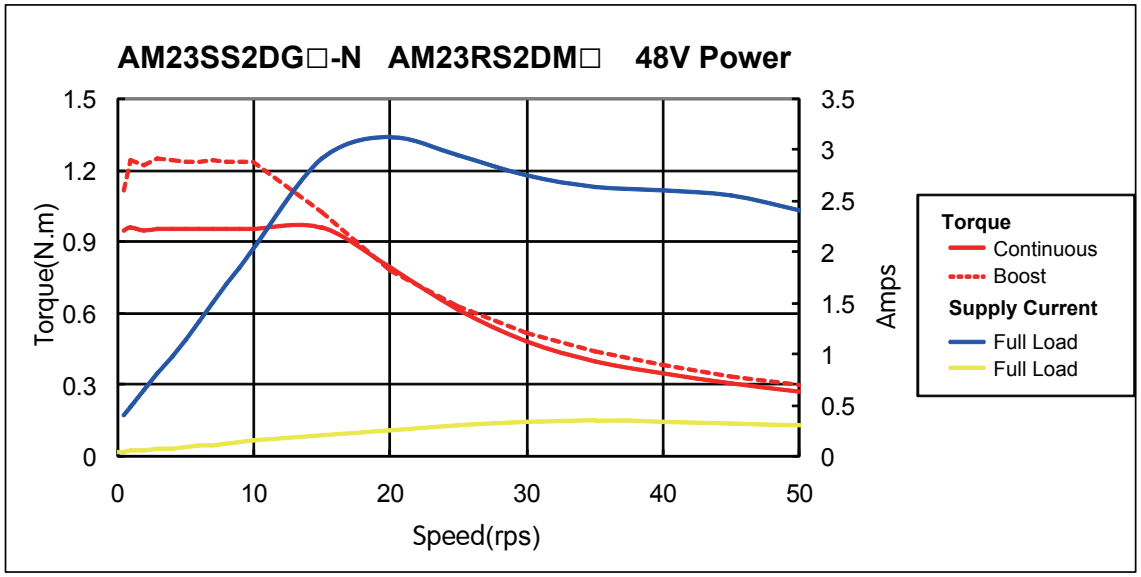

AM17SS3DG□-N AM17RS3DM□ 24V Power
Torque(mN.m)
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
1.5
1
0.5
0
Amps
0
10
20
30
40
50
Speed(rps)
Torque
Continuous
Boost
Supply Current
Full Load
Full Load

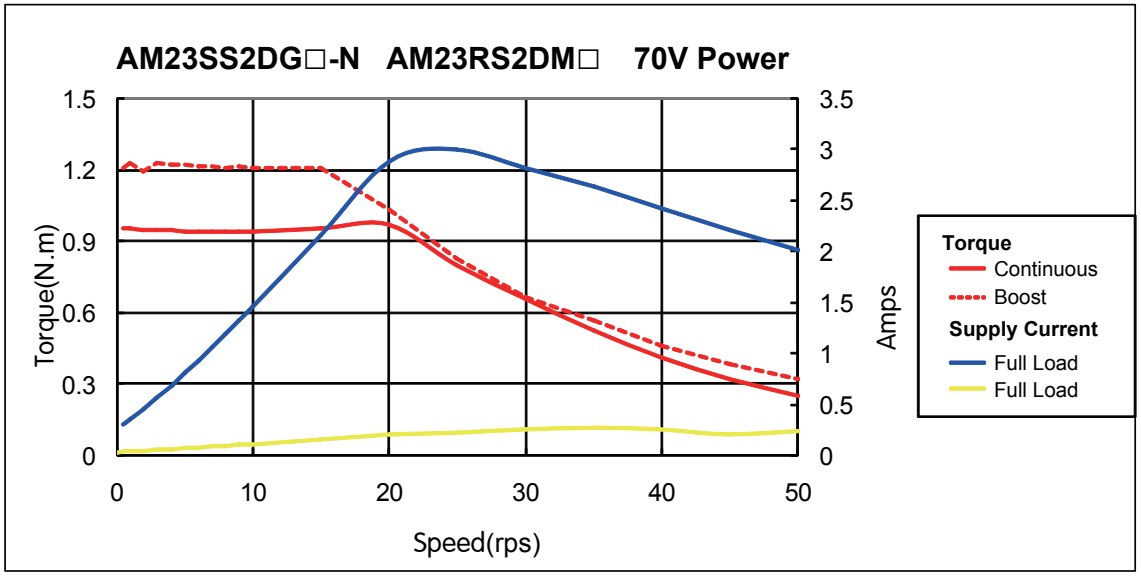

AM17SS3DG□-N AM17RS3DM□ 48V Power
Torque(N.m)
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
1.5
1
0.5
0
Amps
0
10
20
30
40
50
Speed(rps)
Torque
Continuous
Boost
Supply Current
Full Load
Full Load

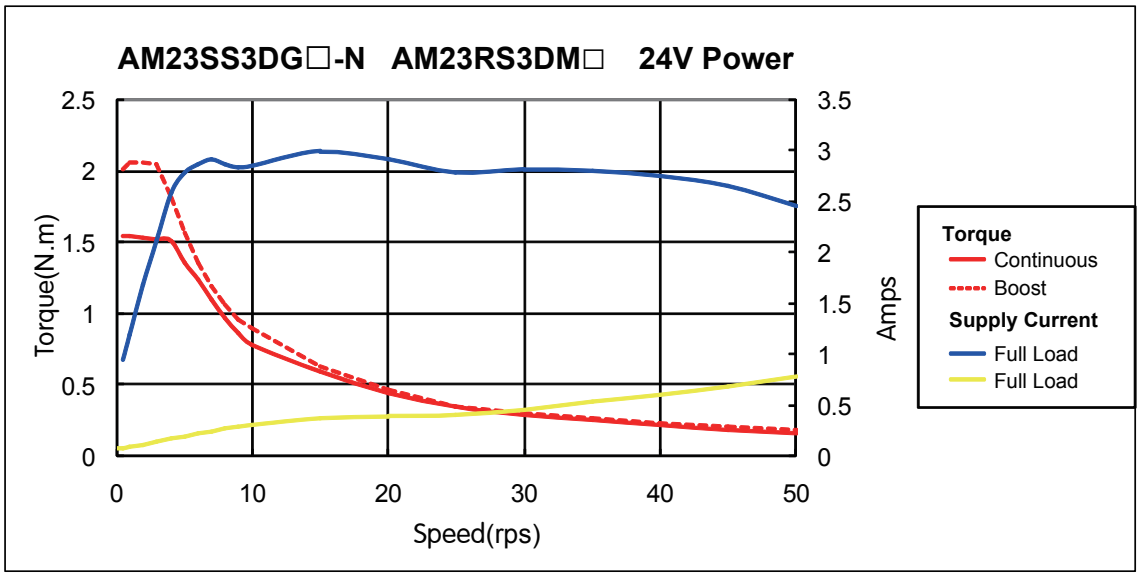

AM17SS4DG□-N AM17RS4DM□ 24V Power
Torque(N.m)
1.5
1.2
0.9
0.6
0.3
0
1.5
1
0.5
0
Amps
0
10
20
30
40
50
Speed(rps)
Torque
Continuous
Boost
Supply Current
Full Load
Full Load

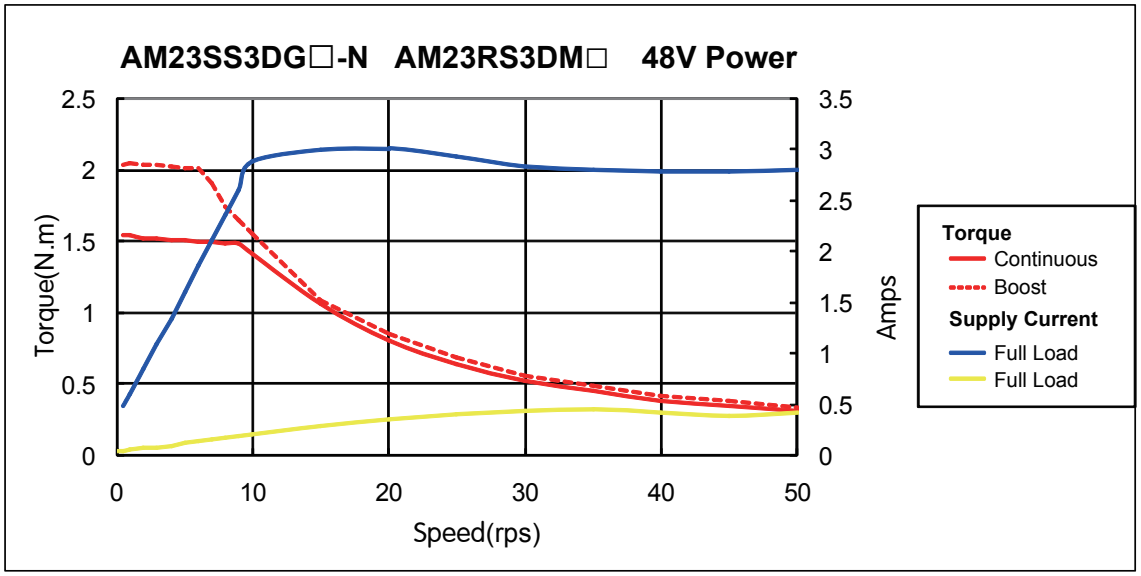

AM17SS4DG□-N AM17RS4DM□ 48V Power
Torque(N.m)
1.5
1.2
0.9
0.6
0.3
0
1.5
1
0.5
0
Amps
0
10
20
30
40
50
Speed(rps)
Torque
Continuous
Boost
Supply Current
Full Load
Full Load

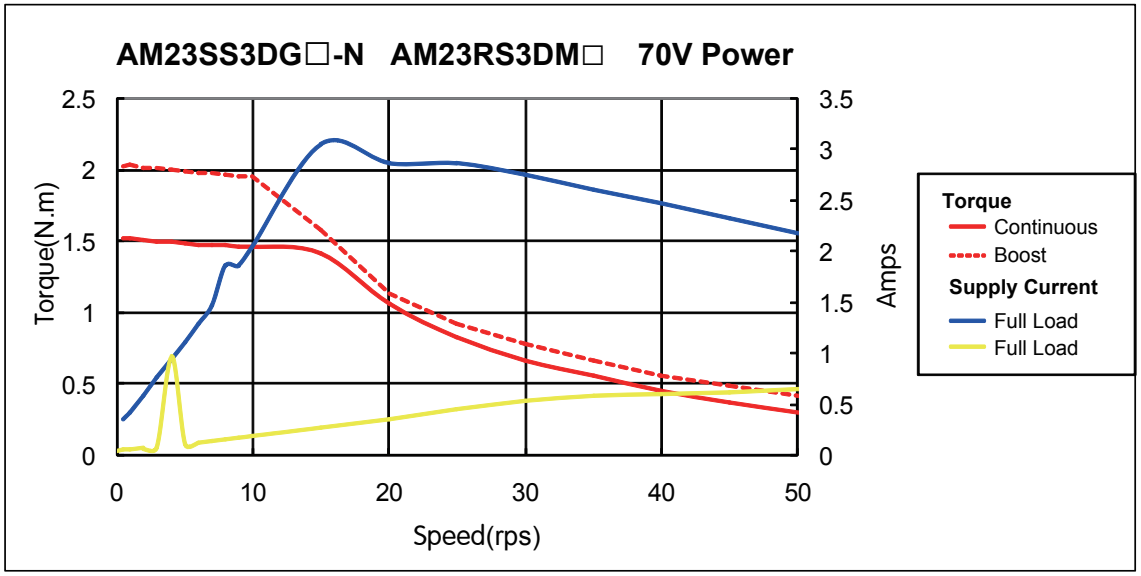

AM23SS2DG□-N AM23RS2DM□ 24V Power
Torque(N.m)
Amps
Speed(rps)
0
0.3
0.6
0.9
1.2
1.5
0.5
1
1.5
2
2.5
3
3.5
0
10
20
30
40
50
Torque
Continuous
Boost
Supply Current
Full Load
Full Load

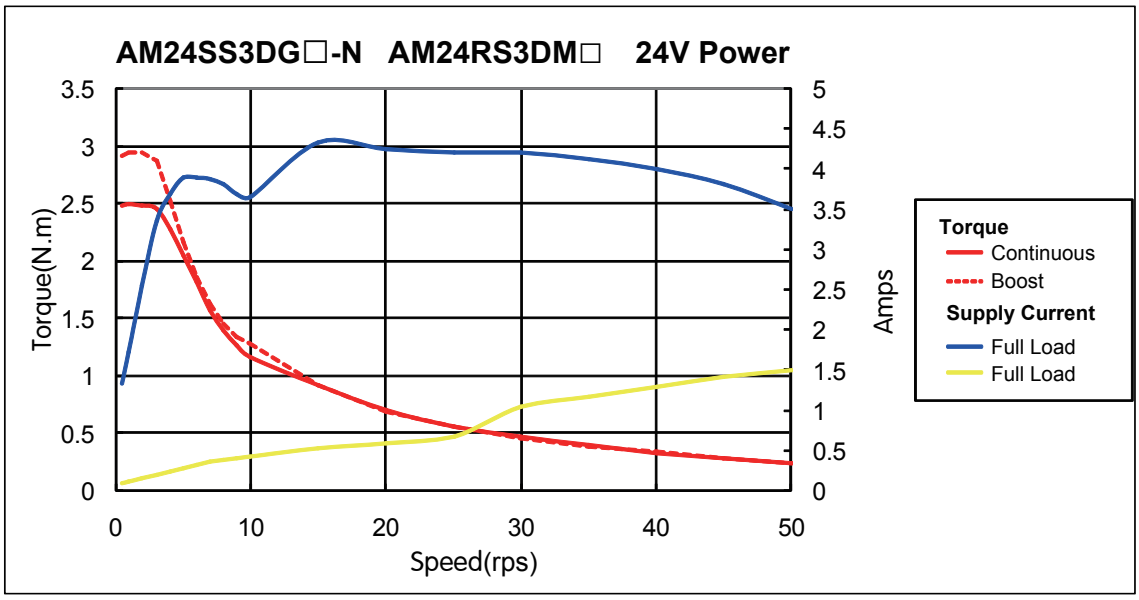

AM23SS2DG□-N AM23RS2DM□ 48V Power
Torque(N.m)
Amps
Speed(rps)
0
0.3
0.6
0.9
1.2
1.5
0.5
1
1.5
2
2.5
3
3.5
0
10
20
30
40
50
Torque
Continuous
Boost
Supply Current
Full Load
Full Load

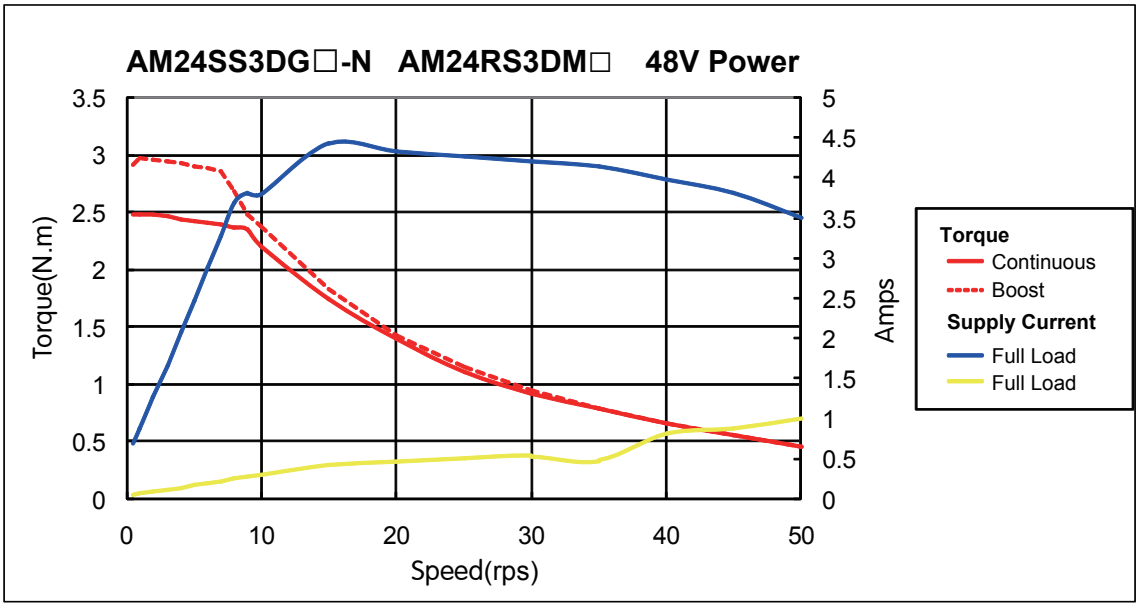

AM23SS2DG□-N AM23RS2DM□ 70V Power
Torque(N.m)
Amps
Speed(rps)
0
0.3
0.6
0.9
1.2
1.5
0.5
1
1.5
2
2.5
3
3.5
0
10
20
30
40
50
Torque
Continuous
Boost
Supply Current
Full Load
Full Load

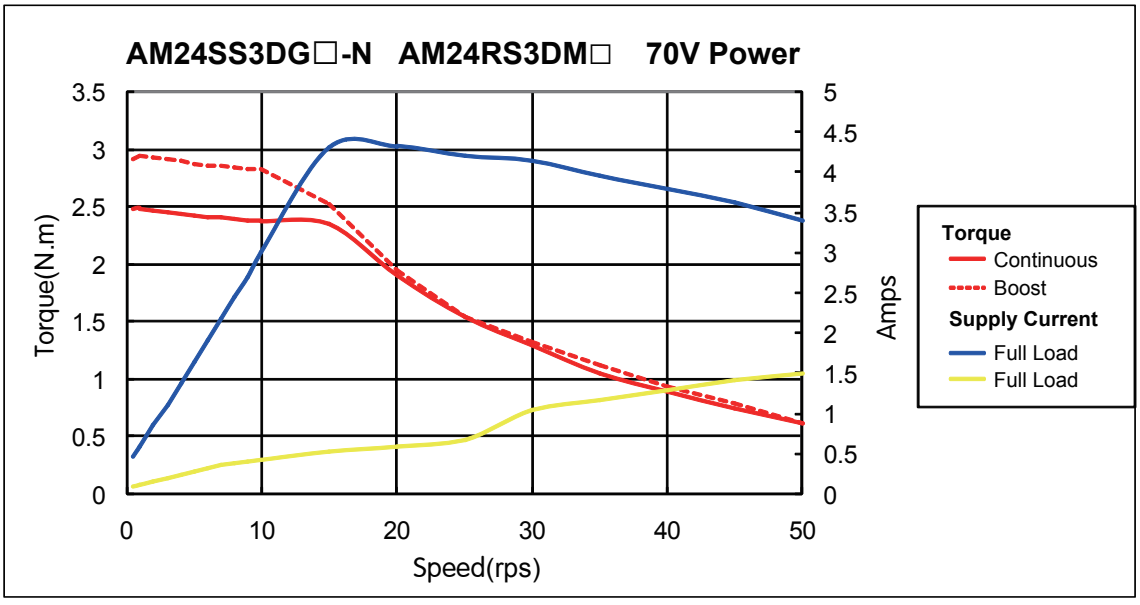

AM23SS3DG□-N AM23RS3DM□ 24V Power
Torque(N.m)
Amps
Speed(rps)
0
0.5
1
1.5
2
2.5
3
3.5
0
10
20
30
40
50
Torque
Continuous
Boost
Supply Current
Full Load
Full Load

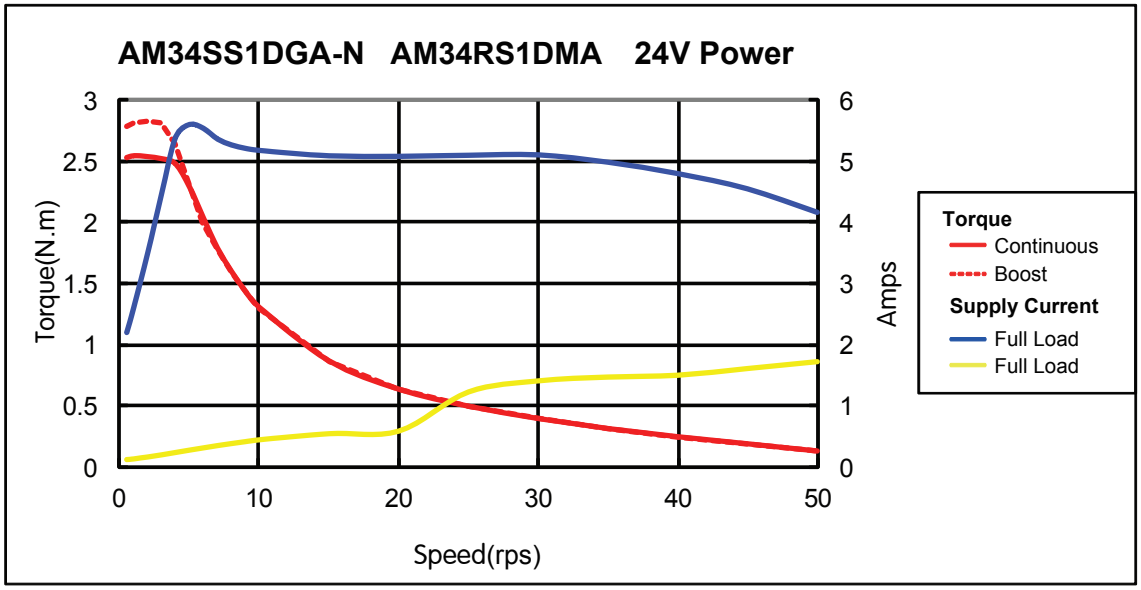

AM23SS3DG□-N AM23RS3DM□ 48V Power
Torque(N.m)
Amps
Speed(rps)
0
0.5
1
1.5
2
2.5
3
3.5
0
10
20
30
40
50
Torque
Continuous
Boost
Supply Current
Full Load
Full Load

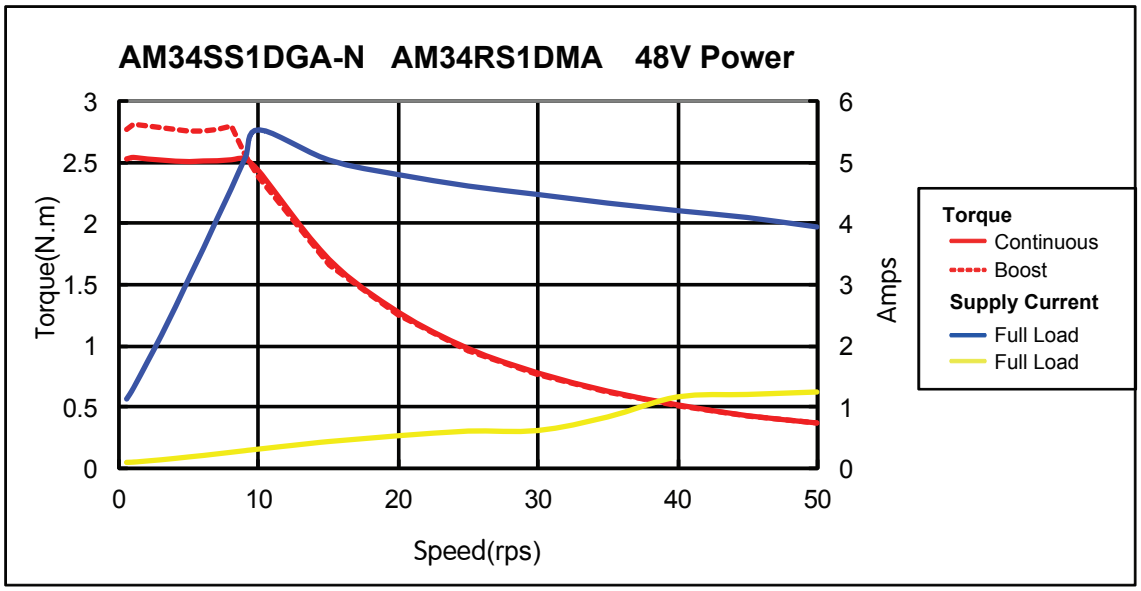

AM23SS3DG□-N AM23RS3DM□ 70V Power
Torque(N.m)
Amps
Speed(rps)
0
0.5
1
1.5
2
2.5
3
3.5
0
10
20
30
40
50
Torque
Continuous
Boost
Supply Current
Full Load
Full Load

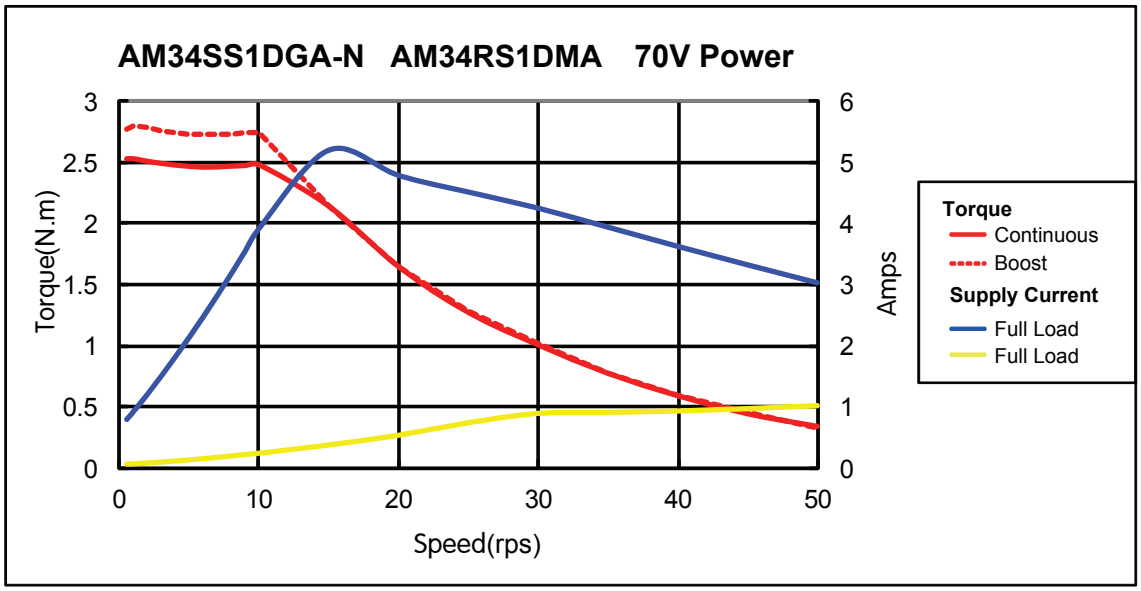

AM24SS3DG□-N AM24RS3DM□ 24V Power
Torque(N.m)
Amps
Speed(rps)
0
0.5
1
1.5
2
2.5
3
3.5
4
4.5
5
0
10
20
30
40
50
Torque
Continuous
Boost
Supply Current
Full Load
Full Load

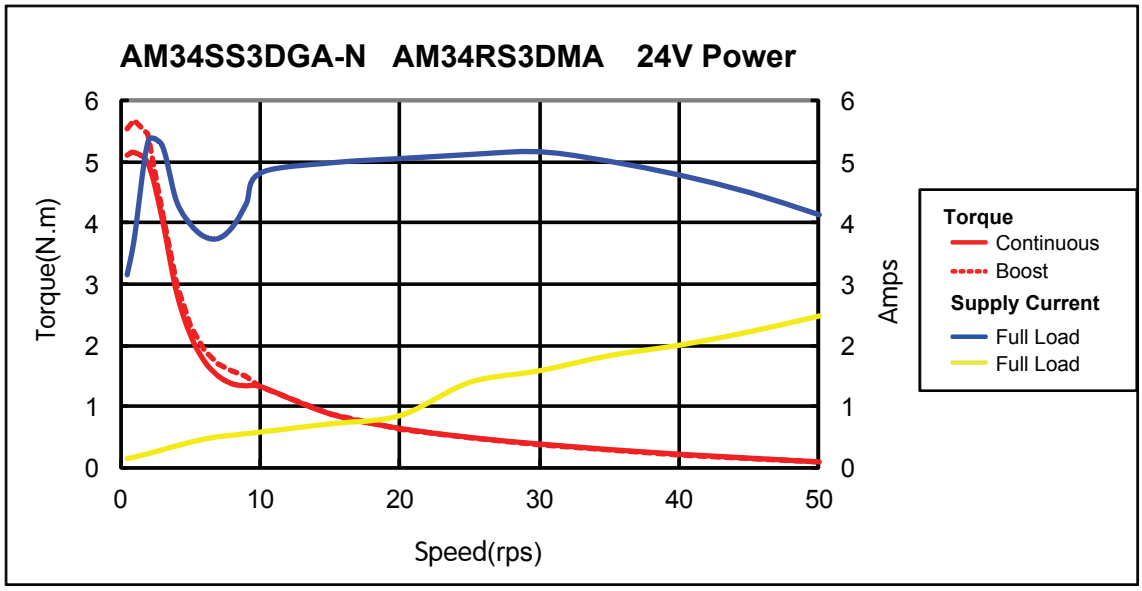

AM24SS3DG□-N AM24RS3DM□ 48V Power
Torque(N.m)
Amps
Speed(rps)
0
0.5
1
1.5
2
2.5
3
3.5
4
4.5
5
0
10
20
30
40
50
Torque
Continuous
Boost
Supply Current
Full Load
Full Load

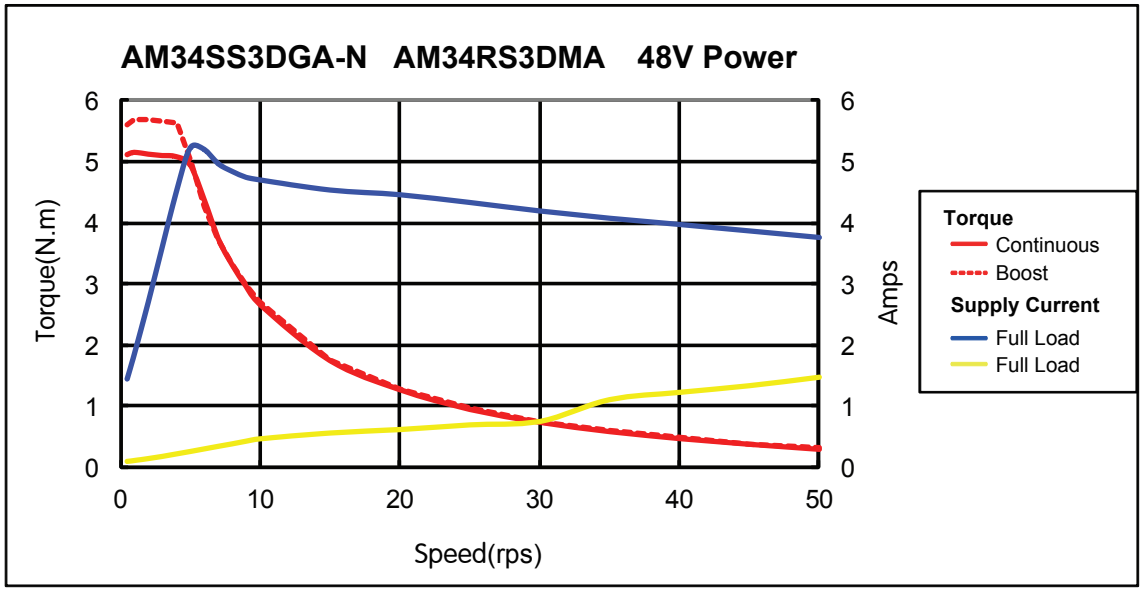

AM24SS3DG□-N AM24RS3DM□ 70V Power
Torque(N.m)
Amps
Speed(rps)
0
0.5
1
1.5
2
2.5
3
3.5
4
4.5
5
0
10
20
30
40
50
Torque
Continuous
Boost
Supply Current
Full Load
Full Load

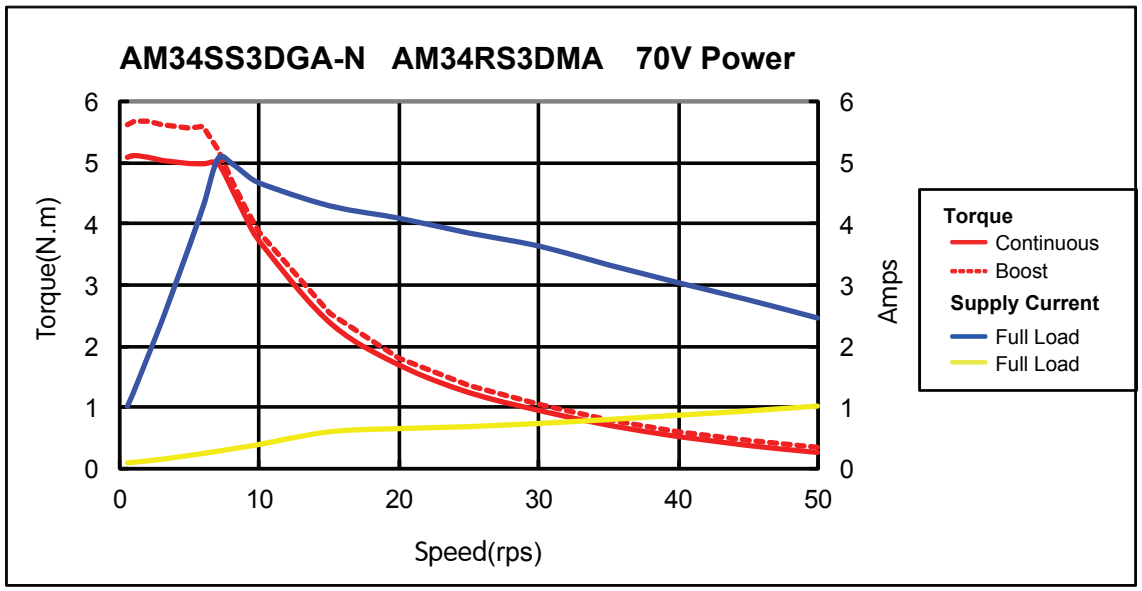

AM34SS1DGA-N AM34RS1DMA 24V Power
Torque(N.m)
Amps
Speed(rps)
0
0.5
1
1.5
2
2.5
3
0
1
2
3
4
5
6
0
10
20
30
40
50
Torque
Continuous
Boost
Supply Current
Full Load
Full Load

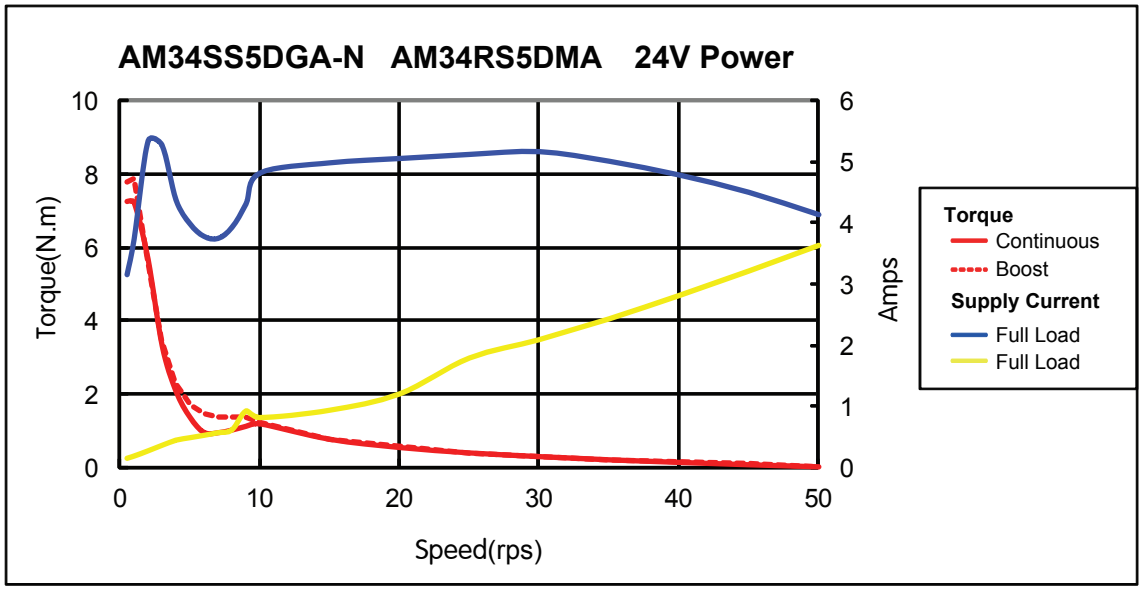

AM34SS1DGA-N AM34RS1DMA 48V Power
Torque(N.m)
Amps
Speed(rps)
0
0.5
1
1.5
2
2.5
3
0
1
2
3
4
5
6
0
10
20
30
40
50
Torque
Continuous
Boost
Supply Current
Full Load
Full Load

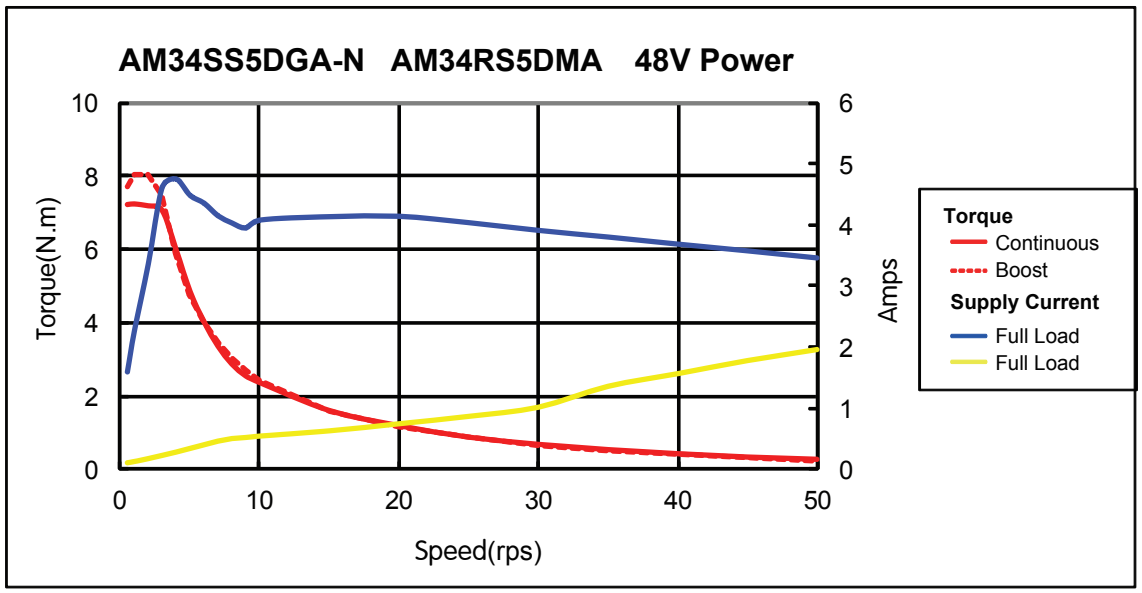

AM34SS1DGA-N AM34RS1DMA 70V Power
Torque(N.m)
Amps
Speed(rps)
0
0.5
1
1.5
2
2.5
3
0
1
2
3
4
5
6
0
10
20
30
40
50
Torque
Continuous
Boost
Supply Current
Full Load
Full Load

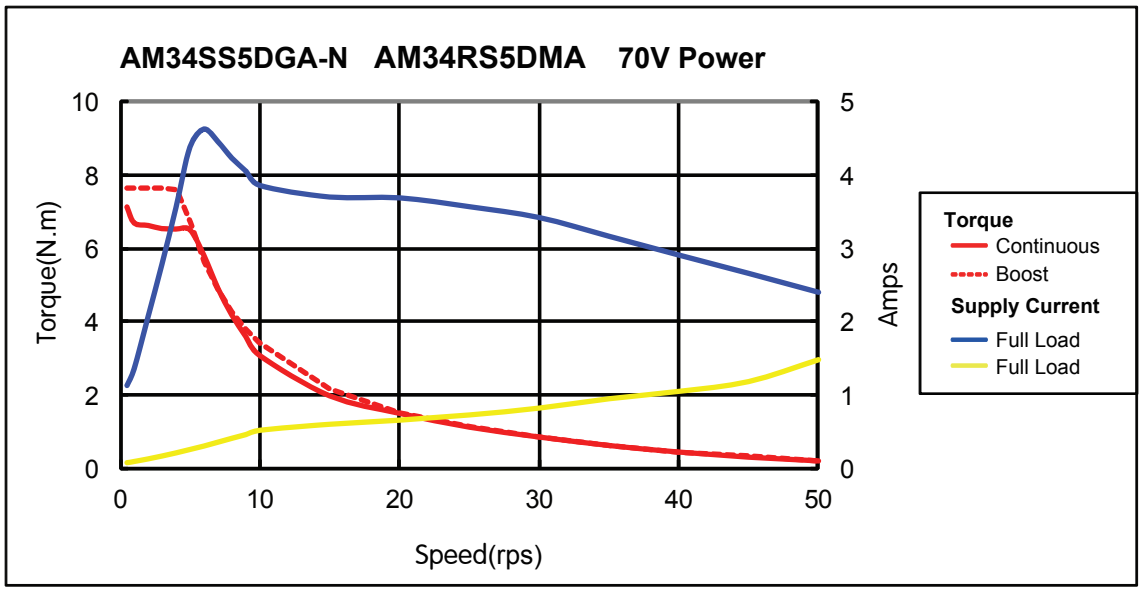

AM34SS3DGA-N AM34RS3DMA 24V Power
Torque(N.m)
Amps
Speed(rps)
0
1
2
3
4
5
6
0
10
20
30
40
50
Torque
Continuous
Boost
Supply Current
Full Load
Full Load


AM34SS3DGA-N AM34RS3DMA 48V Power
Torque(N.m)
Amps
Speed(rps)
0
1
2
3
4
5
6
0
10
20
30
40
50
Torque
Continuous
Boost
Supply Current
Full Load
Full Load


AM34SS3DGA-N AM34RS3DMA 70V Power
Torque(N.m)
Amps
Speed(rps)
0
1
2
3
4
5
6
0
10
20
30
40
50
Torque
Continuous
Boost
Supply Current
Full Load
Full Load


AM34SS5DGA-N AM34RS5DMA 24V Power
Torque(N.m)
Amps
Speed(rps)
0
2
4
6
8
10
0
1
2
3
4
5
6
0
10
20
30
40
50
Torque
Continuous
Boost
Supply Current
Full Load
Full Load

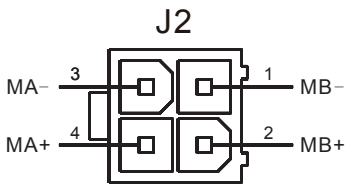

AM34SS5DGA-N AM34RS5DMA 48V Power
Torque(N.m)
Amps
Speed(rps)
0
2
4
6
8
10
0
1
2
3
4
5
6
0
10
20
30
40
50
Torque
Continuous
Boost
Supply Current
Full Load
Full Load


AM34SS5DGA-N AM34RS5DMA 70V Power
Torque(N.m)
Amps
Speed(rps)
0
2
4
6
8
10
0
1
2
3
4
5
0
10
20
30
40
50
Torque
Continuous
Boost
Supply Current
Full Load
Full Load

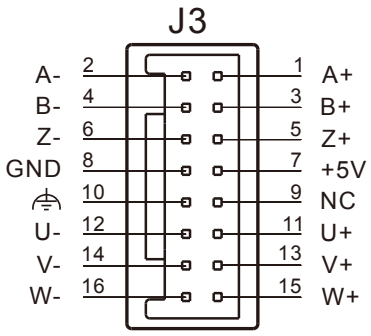
2.7 Connecting the Motor

The SS/RS motors have two cables. One is the motor power cable, the other one is the encoder feedback cable. Plug the motor power cable into the motor connector on the drive and plug the encoder feedback cable into the encoder feedback connector on the drive.

(NOTE: Do not damage or drag the cables on the motor.)



Motor connector on the driver



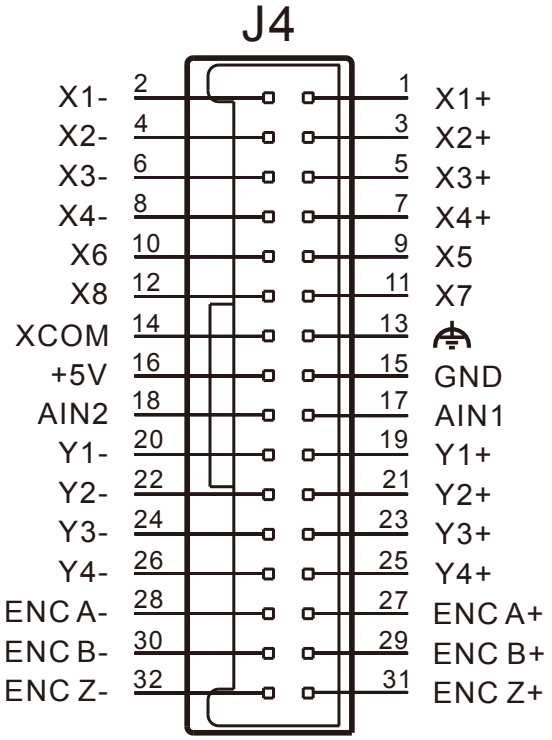
Encoder connector on the driver

Please check the information of mating connectors, extended motor cable and extended encoder cable in below section ”Optional Accessories (Sold separately)”

3 Inputs and Outputs

SSDC inputs and outputs include：

- 8 optically isolated digital inputs,5 - 24VDC logic
- 4 Optically isolated, Open Collector, 30V/100 mA max,
- 2 analog inputs can be configured to 0-5V, 0-10V, ±5V or ±10V signal ranges
- Differential encoder outputs (A±, B±, Z±), 26C31 line driver, 20 mA sink or source max
- Secondary encoder signal input(single-ended or differential) for full closed-loop control



I/O Connector Diagram

3.1 Digital Inputs

3.1.1 X1, X2, X3 and X4 Digital Inputs

X1, X2: Optically isolated, differential, 5-24VDC; Minimum pulse width = 250ns, Maximum pulse frequency = 2MHz;

X3, X4: Optically isolated, differential, 5-24VDC; Minimum pulse width = 100μs, Maximum pulse frequency = 5KHz

X1 can be configured as general purpose input

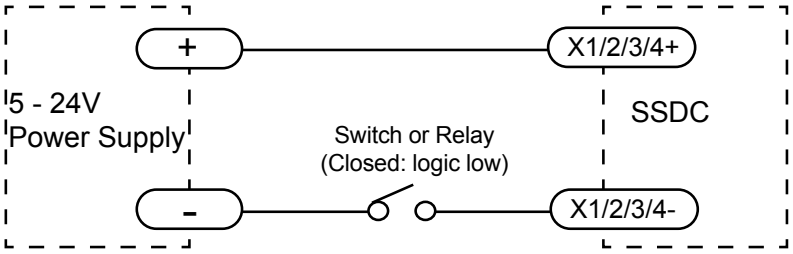
X2 can be configured as general purpose input

X3 can be configured as CW limit sensor input or general purpose input

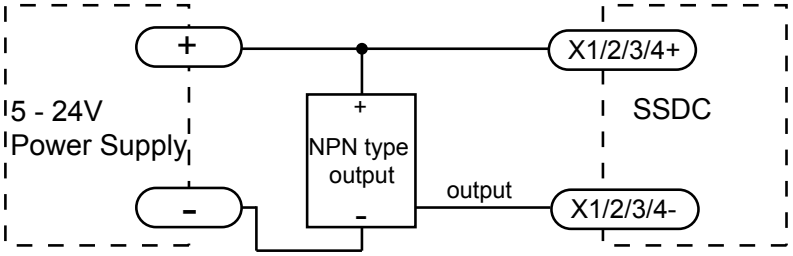
X4 can be configured as CCW limit sensor input or general purpose input

Please use *Step-Servo Quick Tuner* software to configure the function of X1, X2, X3 and X4.

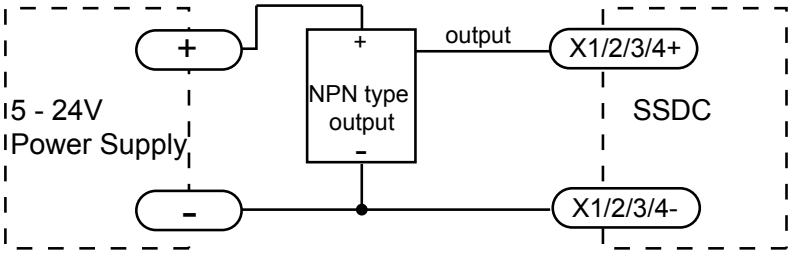
The diagrams below show how to connect the X1, X2, X3 and X4 to various commonly used devices.



Connecting a switch or relay to an input



Connecting a NPN type output to an input



Connecting a PNP type output to an input

3.1.2 X5, X6, X7 和 X8 digital Inputs

X5 ~ X8: Optically isolated, differential, 5-24VDC; Minimum pulse width = 100μs, Maximum pulse frequency = 5KHz;

X5 can be configured as servo on input or general purpose input

X6 can be configured as alarm reset signal input or general purpose input

X7 can be configured as Touch Probe 1 trigger input or general purpose input

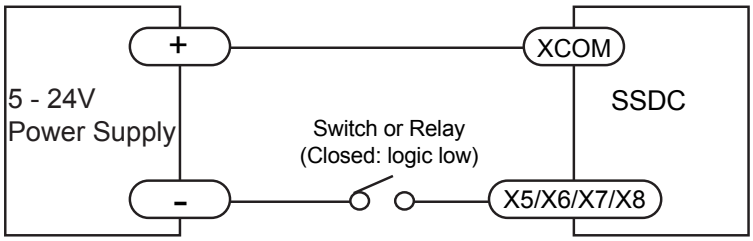
X8 can be configured as Touch Probe 2 trigger input or general purpose input

Because the input is an optically isolated circuit, a 5-24V power supply is needed. For example, you can use the power supply of the PLC when you are using a PLC control system, but if you want to connect a relay or mechanical switch to the input ,you must need a power supply.

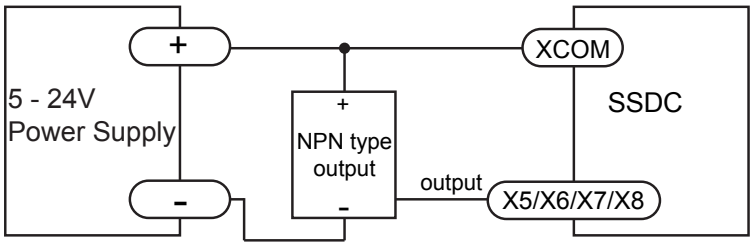
XCOM is an electronics term for a single-ended signal connection to a common voltage. In the case of SS series, if you are using a sourcing(PNP) input signals, you need to connect XCOM to the ground(power supply -),if you are using a sinking(NPN) input signals ,the XCOM need to connect to the power supply +.

Please use *Step-Servo Quick Tuner* software to configure the function of X5, X6, X7 and X8

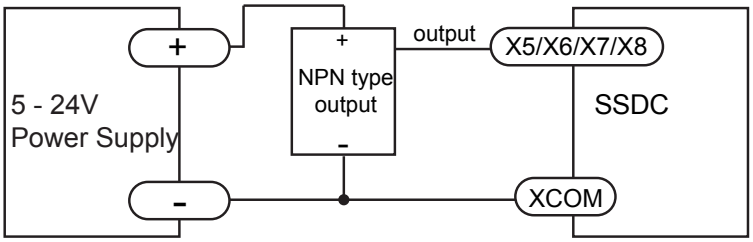
The diagrams below show how to connect the X5, X6, X7 and X8 to various commonly used devices.



Connecting a switch or relay to an input



Connecting a NPN type output to an input



Connecting a PNP type output to an input

3.2 Digital Outputs

Y1, Y2, Y3 and Y4 Digital Outputs

Y1 can be configured as alarm signal output. It can also be configured as static in position signal output(static, checking in position when motor is stopped) ,or as dynamic in position signal output (dynamic, checking in position all the time.)

Y2 can be configured as Tach signal output, tach output produce pulsed relative to the motor position with configurable resolution. It can also be configured as static in position signal output(static, checking in position when motor is stopped) ,or as dynamic in position signal output (dynamic, checking in position all the time.),or as Timing signal output(50 pulses per rotation)

Y3 can be configured as signal output to release brake. It can also be configured as static in position signal output(static, checking in position when motor is stopped) ,or as dynamic in position signal output (dynamic, checking in position all the time.)

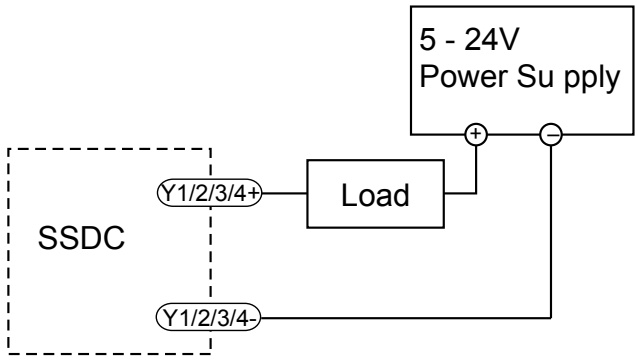
Y4 can be configured as static in position signal output(static, checking in position when motor is stopped) ,or as dynamic in position signal output (dynamic, checking in position all the time.)

Y1, Y2, Y3 and Y4 can be configured by Step-Servo Quick Tuner.

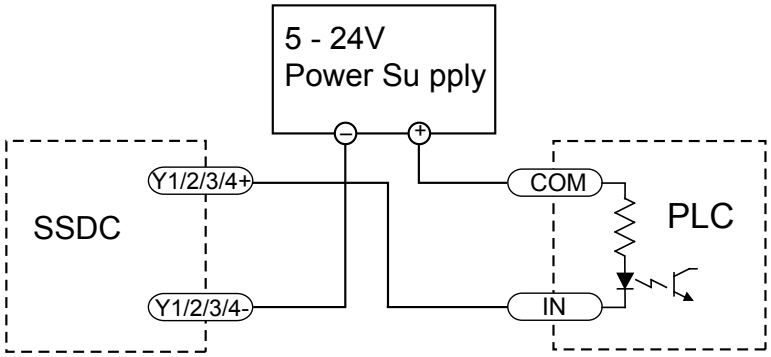
The chats below show how to connect to the output:

(NOTE: Do not connect the outputs to more than 30VDC power supply.

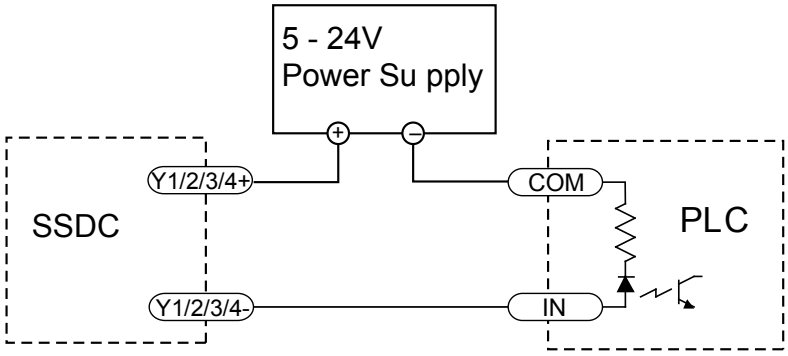
And the current of each output terminal must not exceed 100mA.)



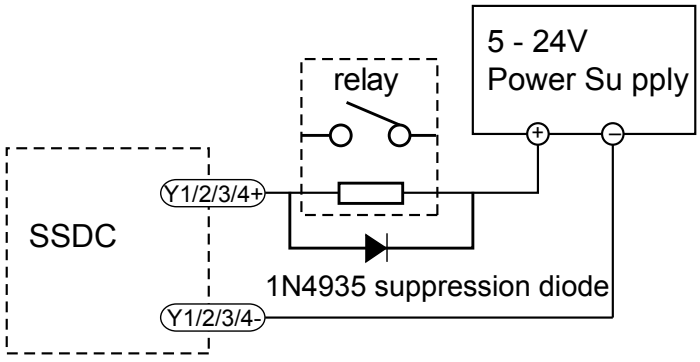
Connecting a sourcing output to load



Connecting a sinking output to PLC's input



Connecting a sourcing output to PLC's input



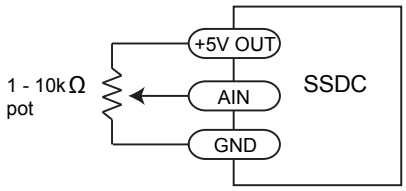
Driving a relay

3.3 Analog Inputs

SSDC series drive has two analog signal inputs which can accept signal range of 0-5V, 0-10V, ±5V and ±10V. The drive can be configured to operate at velocity mode or position mode that is proportional to the analog input.

Use the Step-Servo Quick Tuner to configure the input range, offset, deadband and noisy filter frequency.

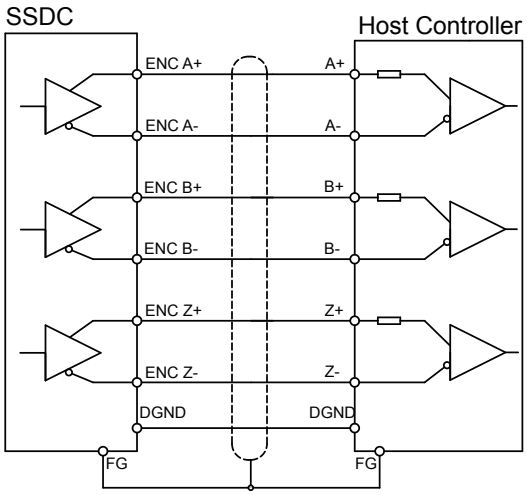
SSDC series provides a +5V/100mA limit power supply that can be used to power external devices such as potentiometer. It is not the most accurate supply for reference, for more precise readings use an external supply that can provide the desired accuracy.



Connecting a potentiometer to an analog input

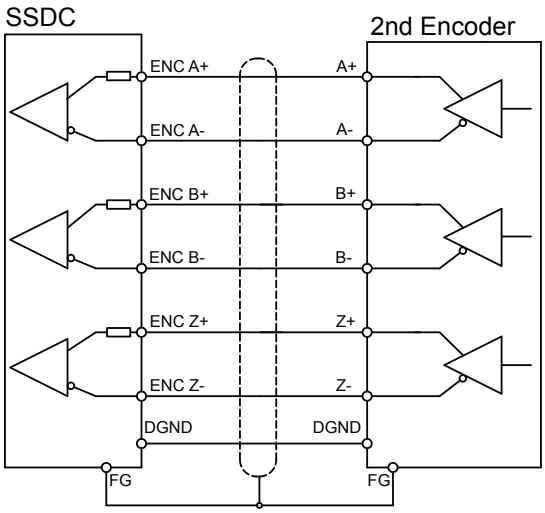
3.4 Encoder output

SSDC has differential encoder outputs (ENC A+/-, ENC B+/-, ENC Z+/-), with 26C31 line driver, 20 mA sink or source current in max. These signals can be connected to the motion controller to be a feedback of the motor position.



3.5 Secondary Encoder Input

SSDC series supports 2-way encoder feedback, one way connect to the motor encoder position feedback, the other way connect to the load side position feedback such as scale, connect to the ENC A+/-, ENC B+/-, ENC Z+/-.



4 Mounting the Drive

Use the M3 or M4 screw to mount the SSDC series drive .The drive should be securely fastened to a smooth, flat metal surface will help conduct heat away from the chassis. If this is not possible, forced airflow from a fan maybe required to prevent the drive from overheating.

- Never use the drive in a place where there is no air flow or the surrounding air is more than 40℃.
- Never put the drive where it can get wet or where metal or other electrically conductive particle particles can get on the circuitry.
- Always provide air flow around the drive. When mounting multiple SSDC drives near each other, maintain at least 2cm of space between drives.

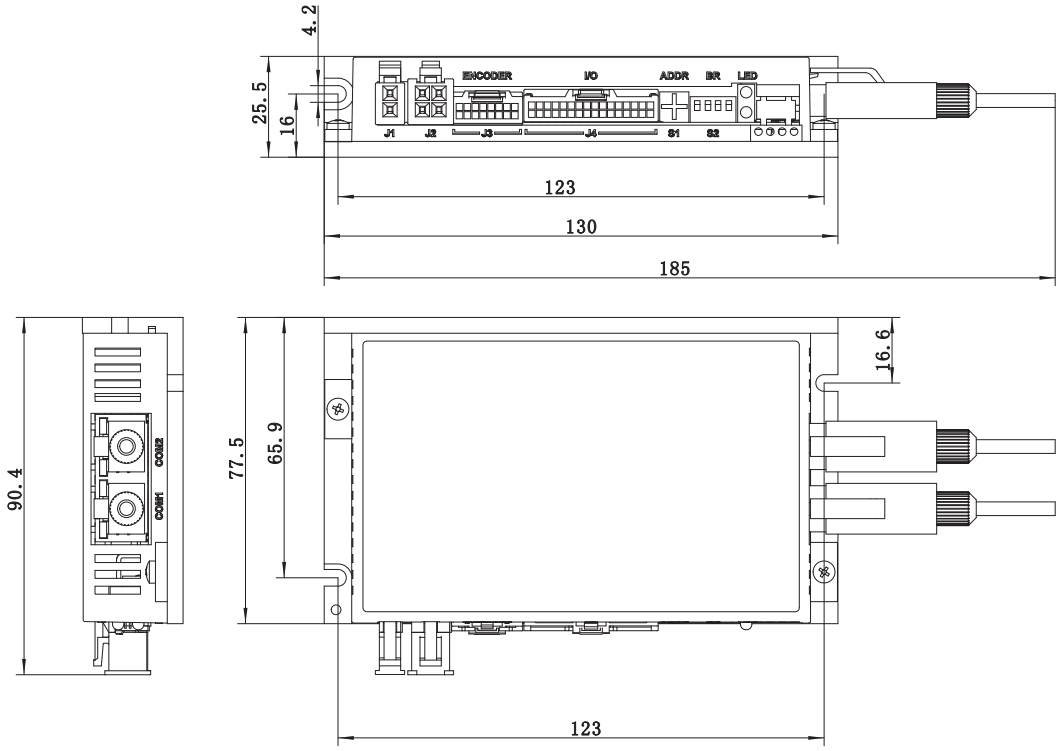
5 LED Error Codes

The SSDC series step-servo package uses red and green LEDs to indicate status. When the motor is enabled, the green LED flashes slowly. When the green LED is solid, the motor is disabled. Errors are indicated by combinations of red and green flashes as shown below.

Code		Error
🟢	Solid green	MOTOR_DISABLED
🟢🟢	Flashing green	MOTOR_ENABLED
🔴🟢	1 red, 1 green	POSITION_LIMIT
🔴🟢🟢	1 red, 2 green	MOVE WHILE DISABLED
🔴🟢🟢🟢	1 red, 3 green	XML_READ_FAILED
🔴🟢🟢🟢🟢	1 red, 4 green	VOLTAGE_HIGH_WARNING
🔴🔴🟢	2 red, 1 green	CCW_LIMIT_TRIP
🔴🔴🟢🟢	2 red, 2 green	CW_LIMIT_TRIP
🔴🔴🟢🟢🟢	2 red, 3 green	INITIAL_POWERUP_ERROR
🔴🔴🟢🟢🟢🟢	2 red, 4 green	ECAT_FAULTS
🔴🔴🔴🟢	3 red, 1 green	OVER_TEMPERATURE
🔴🔴🔴🟢🟢	3 red, 2 green	INTERNAL_VOLTAGE
🔴🔴🔴🟢🟢🟢	3 red, 3 green	Q_PROGRAM_BLANK
🔴🔴🔴🟢🟢🟢🟢	3 red, 4 green	FH_CONFIG_NG
🔴🔴🔴🟢🟢🟢🟢🟢🟢🟢	3 red, 8 green	EMERGENCY_STOP
🔴🔴🔴🔴🟢	4 red, 1 green	VOLTAGE_HIGH
🔴🔴🔴🔴🟢🟢	4 red, 2 green	VOLTAGE_LOW
🔴🔴🔴🔴🔴🟢	5 red, 1 green	OVER_CURRENT
🔴🔴🔴🔴🔴🟢🟢	5 red, 2 green	CURRENT_LIMIT
🔴🔴🔴🔴🔴🟢🟢🟢🟢	5 red, 4 green	COMM OFF LINE
🔴🔴🔴🔴🔴🔴🟢	6 red, 1 green	OPEN_WINDING
🔴🔴🔴🔴🔴🔴🟢🟢	6 red, 2 green	HALL_ENCODER_BAD
🔴🔴🔴🔴🔴🔴🟢🟢🟢	6 red, 3 green	SAFE_TORQUE_OFF & FC POSITION LIMIT
🔴🔴🔴🔴🔴🔴🟢🟢🟢🟢	6 red, 4 green	FC_ENCODER_BAD
🔴🔴🔴🔴🔴🔴🔴🟢	7 red, 1 green	COMM_ERROR
🔴🔴🔴🔴🔴🔴🔴🟢🟢	7 red, 2 green	SAVE_FAILED

6 Reference Materials

6.1 Drive Mechanical Outlines



Unit:mm

Model		
SSDC03-R	SSDC06-R	SSDC10-R
SSDC03-R-FC	SSDC06-R-FC	SSDC10-R-FC
SSDC03-C	SSDC06-C	SSDC10-C
SSDC03-C-FC	SSDC06-C-FC	SSDC10-C-FC

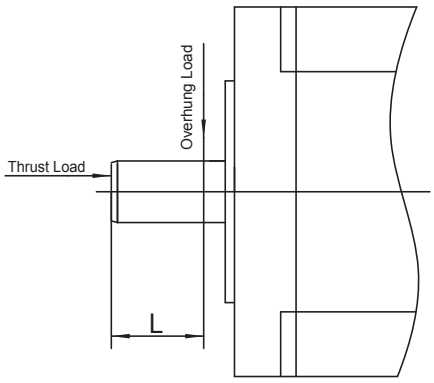
6.2 Technical Specifications

Power Amplifier	
Amplifier Type	Dual H-Bridge, 4 Quadrant
Current Control	4 state PWM at 20 KHz
Output Current	SSDC03: Continuous Current 3A max, Boost Current 4A max (1.5s), current limitation auto set-up by attached motor
	SSDC06: Continuous Current 6A max, Boost Current 7.5A max (1.5s), current limitation auto set-up by attached motor
	SSDC10: Continuous Current 10A max, Boost Current 15A max (1.5s), current limitation auto set-up by attached motor
Power Supply	SSDC03: External nominal 12 - 48 volt DC power supply required, Absolute maximum input voltage range 10 - 53 VDC
	SSDC06: External nominal 24 - 70 volt DC power supply required, Absolute maximum input voltage range 18 - 75 VDC
	SSDC10: External nominal 24 - 70 volt DC power supply required, Absolute maximum input voltage range 18 - 75 VDC
Protection	Over-voltage, under-voltage, over-temp, motor/winding shorts (phase-to-phase, phase-to-ground)
Controller	
Electronic Gearing	Software selectable from 200 to 51200 steps/rev in increments of 2 steps/rev
Encoder Resolution	20000 counts/rev(for AM17/23/24/34SS-N motors)
	4096 counts/rev(for AM11/17/23/24/34RS motors)
Speed Range	Up to 3000rpm
Filters	Digital input noise filter, Analog input noise filter, Smoothing filter, PID filter, Notch filter
Non-Volatile Storage	Configurations are saved in FLASH memory on-board the DSP
Protocol	CoE conform CiA402
Modes of Operation	-R type: SCL Mode, Q, Modbus/RTU
	-C type: CANopen, conform CiA301 & CiA402, Q
Digital Inputs	8 digital inputs
	X1, X2: Optically isolated, differential, 5-24VDC; Minimum pulse width = 250ns, Maximum pulse frequency = 2MHz;
	X3, X4: Optically isolated, differential, 5-24VDC; Minimum pulse width = 100μs, Maximum pulse frequency = 5KHz;
	X5 ~ X8: Optically isolated, differential, 5-24VDC; Minimum pulse width = 100μs, Maximum pulse frequency = 5KHz;
Digital Outputs	4 digital outputs
	Y1 ~ Y4; Optically isolated, Open Collector, 30V/100 mA max, Maximum pulse frequency = 10KHz
Analog Inputs	Two analog inputs
	Analog resolution: 12bit Each input can accept a signal range of 0 to 5 VDC, ±5 VDC, 0 to 10 VDC or ±10 VDC
Encoder Outputs	Differential encoder outputs (A±, B±, Z±), 26C31 line driver, 20 mA sink or source max
+5V Output	4.8~5V, 100 mA max
Communication	-R type: Dual-port RS-285/422(RJ45 connector)
	-C type: Dual-port CANopen(RJ45 connector) with RS-232
Physical	
Ambient Temperature	0 to 40°C (32 to 104°F) when mounted to a suitable heatsink
Ambient Humidity	90% Max., non-condensing

6.3 Recommended Motors

Model	Drive P/N	Torque	Rotor Inertia	Encoder Resolution	Maximum Speed	Mass	Frame Size	Permissible Overhung Load(N) Distance(L) from Shaft End(mm)					Permissible Thrust Load
		Nm	gcm²	counts/rev	RPM	g	mm	0	5	10	15	20	
AM11RS1DMA	SSDC03	0.065	9	4096	3600	118	28	20	25	34	52	-	Less than the motor mass
AM11RS2DMA		0.08	12			168							
AM11RS3DMA		0.125	18			218							
AM17RS1DM□	SSDC03 or SSDC06	0.26	38			390	42	35	44	58	85	-	
AM17RS2DM□		0.42	57			440							
AM17RS3DM□		0.52	82			520							
AM17RS4DM□		0.7	123			760							
AM17SS1DG□-N		0.26	38	20000		390							
AM17SS2DG□-N		0.42	57			440							
AM17SS3DG□-N		0.52	82			520							
AM17SS4DG□-N		0.7	123			760							
AM23RS2DM□	SSDC06 or SSDC10	0.95	260	4096		850	56	63	75	95	130	190	
AM23RS3DM□		1.5	460			1250							
AM23RS4DMA		2.4	365			1090							
AM23SS2DG□-N		0.95	260	20000		850							
AM23SS3DG□-N		1.5	460			1250							
AM23SS4DGA-N		2.4	365			1090							
AM24RS3DM□		2.5	900	4096		1650	60	90	100	130	180	270	
AM24SS3DG□-N		2.5	900	20000		1650							
AM34RS1DMA	SSDC10	2.7	915	4096		2000	86	260	290	340	390	480	
AM34RS3DMA		5.2	1480			3100							
AM34RS5DMA		7.0	2200			4200							
AM34SS1DGA-N		2.7	915	20000		2000							
AM34SS3DGA-N		5.2	1480			3100							
AM34SS5DGA-N		7.0	2200			4200							

□: A or B, refer to motor part numbering system



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